2003 Submitted: ***Int. J. Multiphase Flow*** Editor: Vol: Issue: Pages: **Accepted**	**Power Law and Composite Power Law friction factor correction for laminar and turbulent gas-liquid flow in horizontal pipelines** F. Garcia, R. Garcia, J.C. Padrino, C. Mata, J.L. Trallero, D.D. Joseph *Keywords:* *Abstract:* *Directory:* *Note:*	Record Place: 315
2003 Submitted: ***J. Fluid Mech.*** Editor: Vol: **488** Issue: Pages: **213-223**	**Rise Velocity of Spherical Cap Bubble** D.D. Joseph *Keywords:* *Abstract:* *Directory:* *Note:*	Record Place: 314
2003 Submitted: 2002 ***J. Fluid Mech.*** Editor: Vol: Issue: Pages: **Accepted**	**Universal correlation for the rise velocity of long gas bubbles in round pipes** F. Viana, R. Pardo, R. Ya'nez, J. L. Trallero, D.D. Joseph *Keywords:* *Abstract:* We collected all of the published data we could find on the rise velocity of Taylor bubbles in stagnant fluids. Data from 255 experiments from the literature and 7 new experiments collected at PDVSA Intevep for fluids with viscosities ranging from 1 mPas up to 3900 mPas were assembled on spread sheets and processed in log-log plots of the normalized rise velocity, Fr =U/(gD)1/2 Froude velocity vs. Reynolds number, R = (D3g (rho_l - rho_g) rho_l)1/2/mu for fixed ranges of the Eo"tvo"s number, Eo" = g rho_l D2/sigma where D is the pipe diameter, rho_l , rho_g and sigma are densities and surface tension. The plots give rise to power laws in Eo"; the composition of these separate power laws emerge as bi-power laws for two separate flow regions for large and small Reynolds. *Directory:* **archive/Intevep/2002/papers/TaylorBubbles/UnivCorrelation2.-- (with Appendix)** *Note:*	Record Place: 313
2003 Submitted: ***J. Fluid Mech.*** Editor: Vol: **480** Issue: Pages: **119-128**	**Particle-Laden Tubeless Siphon** J Wang, D.D. Joseph *Keywords:* *Abstract:* *Directory:* *Note:*	Record Place: 312
2003 Submitted: ***J. Fluid Mech.*** Editor: Vol: **479** Issue: Pages: **191-197**	**Viscous Potential Flow** D.D. Joseph *Keywords:* *Abstract:* *Directory:* *Note:*	Record Place: 311
2003 Submitted: 2000 ***Int. J. Multiphase Flow*** Editor: Vol: **29** Issue:**1** Pages: **117-169**	**The lattice Boltzmann equation method: theoretical interpretation, numerics and implications** R.R. Nourgaliev, T.G. Theofanous, D.D. Joseph *Keywords:* *Abstract:* The Lattice Boltzmann Equation (LBE) method is reviewed and analyzed. The focus is on the fundamental principles of the approach; its `pros' and `cons' in comparison to other methods of the computational uid dynamics (CFD); and its perspectives as a competitive alternative computational approach for uid dynamics. … *Directory:* **archive/DDJ/2001/papers/LBEmethod/csamp** *Note:*	Record Place: 310
2003 Submitted: 2000 ***Int. J. Multiphase Flow*** Editor: Vol: **29** Issue: **3** Pages: **495-509**	**Distributed Lagrange multiplier method for particulate flows with collisions** P. Singh, T.I. Hesla, D.D. Joseph *Keywords:* *Abstract:* A modified distributed Lagrange multiplier/fictitious domain method (DLM) that allows particles to undergo collisions is developed for particulate flows. In the earlier versions of the DLM method for Newtonian and viscoelastic liquids described in.. *Directory:* **/archive/DDJ/2001/papers/modDLM-collisions/Manuscript.--** *Note:* Singh at Dept Mech. Engrg, New Jersey Inst. Tech. Newark, NJ	Record Place: 309
January 2003 Submitted: 2002	**Bi-power law correlations for sedimentation transport in pressure**	Record Place: 308

Int. J. Multiphase Flow Editor: Vol: **29** Issue: **3** Pages: **495-509**	**driven channel flows** J. Wang, D.D. Joseph, N.A. Patankar, M. Conway and B. Barree *Keywords:* New data from slot experiments for fractured reservoir were collected ... Those correlations can be used as predictive tools in the fracturing industry but they are in implicit form. In this paper we find correlations for bed load transport of slurries as a composition of bi-power laws in the proppant and fluid Reynolds number with exponents and prefactors expressed as logarithmic functions of dimensionless sedimentation numbers... *Abstract:* *Directory:* **archive/DDJ/2002/papers/bi-powerCorr/Bi-Pwr-transport** *Note:*	
2003 Submitted: ***Perspectives and Problems in Nonlinear Science: A Celebratory Volume in Honor of Larry Sirovich*** Editor: Jerrold E. Marsden, L. Sirovich, Katepalli R. Sreenivasan, eds, Springer-Verlag Vol: Issue: Pages:	**A Maxwell memory model for delayed weather response to solar heating** D.D. Joseph, K.R. Sreenivasan *Keywords:* *Abstract:* A linear Maxwell-type viscoelastic model, relating seasonal variations of temperature at any given place on the Earth to variations in the length of the day, is proposed. Comparison with observations shows excellent agreement for midlatitudes, and the … *Directory:* **95_7** *Note:*	Record Place: 307
2003 Submitted: 2002 ***J. Non-Newtonian Fluids*** Editor: Vol: **111** Issue: Pages: **87-105**	**Viscoelastic Potential Flow Analysis of Capillary Instability** T. Funada, D.D. Joseph. *Keywords:* *Abstract:* Analysis of the linear theory of capillary instability of threads of Maxwell fluids of diameter *D* is carried out for the unapproximated normal mode solution and for a solution based on viscoelastic potential flow. The analysis here extends the analysis of viscous potential flow [Int. J. Multiphase Flow 28 (2002) 1459] to viscoelastic fluids of Maxwell type. The analysis … *Directory:* *Note:* © Elsevier Science B.V. **NEED TO SCAN IN**	Record Place: 306
2002 Submitted: Editor: Vol: Issue: http://www.efluids.com/efluids/books/joseph.htm Pages:	**Interrogations of Direct Numerical Simulation of Solid-Liquid Flow** D.D. Joseph *Keywords:* *Abstract:* In direct simulation the fluid motion is resolved numerically and the forces which move the particles are computed rather than modeled. This procedure opens new windows for understanding and modeling. Numerical methods are discussed based on body fitted moving unstructured grids and another on a fixed grid in which the portions of the… *Directory:* **http://www.efluids.com/efluids/books/joseph.htm** *Note:*	Record Place: 305
2002 Submitted: 2001 ***Proceedings of the 14th International Conf. on Domain Decomposition Methods*, Mexico (January).** Editor: Vol: Issue: Pages:	**Direct Simulation of the motion of settling ellipsoids in Newtonian fluid** T.-W. Pan, R. Glowinski, D.D. Joseph, R. Bai. *Keywords:* *Abstract:* *Directory:* *Note:*	Record Place: 304
2002 Submitted: 2002 ***Int. J. Multiphase Flow*** Editor: Vol: Issue: Pages: **accepted**	**Modeling Foamy Oil Flow in Porous Media II: Nonlinear Relaxation Time Model of Nucleation** D.D. Joseph, A. Kamp, T. Ko, R. Bai *Keywords:* *Abstract:* In a previous communication (Jospeh, Kamp and Bai 2002, hereafter called Part I) we presented a model of the flow of foamy oil in porous media in situations in which the bubbles do not coalesce to produce the percolation of free gas so that the gas moves	Record Place: 303

	with the oil as it evolves. A central role in that theory is an equation of state, called the solubility isotherm, *Directory:* **archive/Intevep/2002/papers/FoamyOil-II/nucleation** *Note:*	
2002 Submitted: 2001 ***Int. J. Multiphase Flow*** Editor: Vol:**28** Issue:**10** Pages: **1659-1686**	**Modeling Foamy Oil Flow in Porous Media** D.D. Joseph, A. Kamp, R. Bai *Keywords:* *Abstract:* Certain heavy oils which foam under severe depressurization give rise to increased recovery factor and an increased rate of production under solution gas drive. These oils not only stabilize foam, but also stabilize dispersion of gas bubbles at lower … *Directory:* **archive/Intevep/2001/papers/foamy-oils_01/foamyOils3.--** *Note:* revision of paper pubd by IMA, see Intevep/2000/papers/foamy-oils2/	Record Place: 302
2002 Submitted: 2001 ***Int. J. Multiphase Flow*** Editor: Vol:**28** Issue: **8** Pages: **1249-1268**	**Stability of stratified gas-liquid flows** C. Mata, E. Pereyra, J. L. Tallero, and D.D. Joseph *Keywords:* *Abstract:* We have computed stability limits for Kelvin Helmholtz instability of superposed gas-liquid flow, comparing theories of Taitel and Dukler (1976), Lin and Hanratty (1986), Barnea and Taitel (1993) and Funada and Joseph (2001). The theories are compared with literature data on air-water flow and with new data from a 0.0508 m I.D. flow loop at PDSVA-Intevep, using a 0.480 Pa.s oil and air. *Directory:***archive/Intevep/2001/papers/StratifiedFlow/KHandothers.doc.** *Note:*	Record Place: 301
2002 Submitted: ***Int. J. Multiphase Flow*** Editor: Vol:**28** Issue: **9** Pages: **1459-1478**	**Viscous potential flow analysis of capillary instability** T. Funada, D.D. Joseph *Keywords:* *Abstract:* Capillary instability of a viscous fluid cylinder of diameter D surrounded by another liquid is determined by a Reynolds number J=V D rho_l/mu_l, a viscosity ratio m=mu_a/mu_l and a density ratio l=rho_a/rho_l. Here V=gamma/mu_l is the capillary collapse velocity based on the more viscous liquid... *Directory:* **archive/DDJ/2001/papers/Capillary/C-InstabSh.tex** *Note:*	Record Place: 300
2002 Submitted: 2000 ***IMA Volumes in Mathematics and its Applications, Volume 131: Resource Recovery, Confinement, and Remediation of Environmental Hazards*** Editor: J. Chadam, A. Cunningham, R.E. Ewing, P. Ortoleva, M. Wheeler, Springer-Verlag Vol: Issue: Pages: **81-113**	**Foamy Oil Flow in Porous Media** D.D. Joseph, A.M. Kamp, R. Bai *Keywords:* *Abstract:* Certain heavy oils which foam under severe depressurization give rise to increased recovery factor and an increased rate of production under solution gas drive. These oils not only stabilize foam, but also stabilize dispersion of gas bubbles at lower volu *Directory:* **REVISED in 2000/papers/foamy-oils2/foamyOils2.--, archive/Intevep/1999/papers/FoamyOilsLTX/** *Note:* M Huerta was co-author in earlier version submitted to JFM	Record Place: 299
August 2002 Submitted: 2001 ***Int. J. Multiphase Flow*** Editor: Vol: **28** Issue: **8** Pages: **1269-1292**	**Power law correlations for sediment transport in pressure driven channel flows** N.A. Patankar, D.D. Joseph, J. Wang, R. Barree, M. Conway, M. Asadi *Keywords:* *Abstract:* Lift forces acting on particles play a central role in many cases, such as sediment transport, proppant transport in fractured reservoirs, removal of drill cuttings in horizontal drill holes and cleaning of particles from surfaces. We study the problem of lift using 2D direct numerical simulations and experimental data. *Directory:* **archive/DDJ/2001/papers/P-LawSediment/expt_corr_pap.doc** *Note:*	Record Place: 298
2002 Submitted: 2002 ***Int. J. Multiphase Flow*** Editor: Vol: ***28*** Issue:**7**	**Finite element method simulation of turbulent wavy core-annular using a k-ω turbulence model method** T. Ko, H. G. Choi, R. Bai, D.D. Joseph *Keywords:* *Abstract:* A numerical simulation of wavy core flow was carried out by Bai, Kelkar and	Record Place: 297

Pages: ***1205-1222***	Joseph. (1996). ... In our present simulation, the SST (shear stress transport) turbulence model is used to solve the turbulent kinetic energy and dissipation rate equations and a splitting method is used to solve Navier-Stokes equations for the wave shape, pressure gradient and the profiles of velocity and pressure in turbulent wavy core flows. *Directory:* **archive/DDJ/2002/papers/Ko-FiniteTurbulent/Final_turb_paper_small.doc** *Notes:*	
2002 Submitted: 2001 ***J. Fluid Mech.*** Editor: Vol: **454** Issue: Pages: **263-286**	**Slip velocity and lift** D.D. Joseph, D. Ocando *Keywords:* *Abstract:* The lift force on a circular particle in plane Poiseuille flow perpendicular to gravity is studied by direct numerical simulation. The angular slip velocity Omega_s=gamma/2-Omega_p, where gamma/2 is the angular velocity of the fluid at a point where the *Directory:* **archive/DDJ/2000/papers/SlipVelocity/SV-Lift-REV.doc** *Note:* PY Huang was co-author, dropped in revised versions.	Record Place: 296
2002 Submitted: 2001 ***J. Fluid Mech.*** Editor: Vol: **451** Issue: Pages: **169-191**	**Fluidization of 1204 spheres: simulation and experiment** T.W. Pan, D.D. Joseph, R. Bai, R. Glowinski, V. Sarin *Keywords:* *Abstract:* In this paper we study the fluidization of 1204 spheres at Reynolds numbers in the thousands using the method of distributed Lagrange multipliers. The results of the simulation are compared with a real experiment. *Directory:* **archive/DDJ/2001/papers/Fluidization1204/sim-experiment.doc** *Note:*	Record Place: 295
2002 Submitted: 2000 ***J. Fluid Mech.*** Editor: Vol: **453** Issue: Pages: **109-132**	**Rayleigh-Taylor instability of viscoelastic drops at high Weber numbers** D.D. Joseph, G.S. Beavers, T. Funada *Keywords:* *Abstract:* Movies of the breakup of viscous and viscoelastic drops in the high-speed airstream behind a shock wave in a shock tube have been reported by Joseph, Belanger and Beavers 1999. A Rayleigh-Taylor stability analysis for the initial breakup of a drop of Newt *Directory:* **archive/DDJ/1999/papers/RT_Instability/RTI_We2001.--** *Note:* Toshio Funada at Numazu College of Technology, Ooka 3600, Namazu, Shigouka, Japan	Record Place: 294
2001 Submitted: 2001 ***Math Models Methods Appl. Sci.*** Editor: Vol: **12** Issue: **11** Pages: **1653-1690**	**Orientation of symmetric bodies falling in a second-order liquid at nonzero Reynolds number** G.P. Galdi, M. Pokorny, A. Vaidya, D.D. Joseph, J. Feng *Keywords: sedimentation, orientation, second-order fluid, torque, tilt angle* *Abstract:* We study the steady translational fall of a homogeneous body of revolution around an axis a, with fore-and-aft symmetry, in a second-order liquid at nonzero Reynolds (Re) and Weissenberg (We) numbers. We show that, at first order in these parameters, only *Directory:* **archive/DDJ/2001/papers/Galdi/nonzeroRe.pdf** *Note:* Giovanni Paolo Galdi is corsp author. Galdi and Vaidya at Dept Mech. engrg, Univ. Pittsburgh, PA. Pokorny at Palacky Univ., Dept of Mathematical Analysis and Num Math. Olomouc, 772000, Czech Republic. Feng at CUNY City College, Levich Inst. NY, NY.	Record Place: 293
2001 Submitted: ***Proc. of Caribbean congress of Fluid Mechanics (LACAFLUM 2001)*** Editor: Vol: Issue: Pages:	**Lift correlations from direct numerical simulation of solid-liquid flow** D.D. Joseph *Keywords:* *Abstract:* Lift forces acting on a fluidized particle plays a central role in many important applications, such as the removal of drill cuttings in horizontal drill holes, sand transport in fractured reservoirs, sediment transport and cleaning of particles from surf *Directory:* **archive/DDJ/2001/papers/LiftCorrelations/LACAFLUM.doc** *Note:*	Record Place: 292
2001 Submitted: 2000 ***Colloids and Surfaces A, Physicochemical and Engineering Aspects*** Editor: Vol: **180** Issue:**1-2**	**Adsorption of Intan-100 at the Bitumen/Aqueous Solution Interface Studied by Spinning Drop Tensiometry** M. Di Lorenzo, H.T.M. Vinagre, D.D. Joseph *Keywords:* *Abstract:* We present an experimental study on the adsorption behaviour of Intan-100, a non-ionic surfactant, at the bitumen/water interface when the density difference between the two phases is increased by diluting the crude oil with 10% Xylene by weight or using *Directory:* **archive/DDJ/2000/papers/adsorption-Intan-100/adsorption.--**	Record Place: 291

Pages: **121-130**	*Note:*	
2001 Submitted: 2000 ***J. Fluid Mech.*** Editor: Vol: **438** Issue: Pages: **101-128**	**Fluidization by lift of 300 circular particles in plane Poiseuille flow by direct numerical simulation** H.G. Choi, D.D. Joseph *Keywords:* *Abstract:* We study the transport of a slurry of heavier than liquid circular particles in a plane pressure driven flow in a direct simulation. The flow is calculated in a periodic domain. *Directory:* **archive/DDJ/2000/papers/300particles-A.doc + -B.doc (2 parts)** *Note:*	Record Place: 290
2001 Submitted: 2001 ***J. Fluid Mech.*** Editor: Vol: **445** Issue: Pages: **55-76**	**A correlation for the lift-off of many particles in plane Poiseuille flows of Newtonian fluids** N.A. Patankar, T. Ko, H.G. Choi, D.D. Joseph *Keywords:* *Abstract:* Choi & Joseph (2000) reported a two-dimensional numerical investigation... We perform similar simulations. Particles heavier than the fluid are initially placed in a closely packed ordered configuration at the bottom of a periodic channel. *Directory:* **archive/DDJ/2000/papers/300part-lift/300_part_lift.doc** *Note:* Pub Ref: FM11-454	Record Place: 289
2001 Submitted: 2000 ***J. Fluid Mech.*** Editor: Vol: **438** Issue: Pages: **67-100**	**Lift-off of a single particle in Newtonian and viscoelastic fluids by direct numerical simulation** N.A. Patankar, P.Y. Huang, T. Ko, D.D. Joseph *Keywords:* *Abstract:* In this paper we study the lift-off to equilibrium of a single circular particle in Newtonian and viscoelastic fluids by direct numerical simulation. A particle heavier than the fluid is driven forward on the bottom of a channel by a plane Poiseuille flow *Directory:* **archive/DDJ/1999/papers/singleParticle/SinglePart-Lift.pdf** *Note:* Reply to comments by Reviewers for Lift-off of a single particle... by Patankar, Huang, Ko and Joseph. /archive/DDJ/1999/papers/singleParticle/SinglePart_Rev.pdf.	Record Place: 288
2001 Submitted: ***Phys. Fluids*** Editor: Vol: Issue: Pages: **Submitted**	**Lift-off of a single particle in an Oldroyd-B fluid** T. Ko, N.A. Patankar, D.D. Joseph *Keywords:* *Abstract:* In this note we study the lift force on a circular particle near a wall in a plane Poiseuille flow of an Oldroyd-B fluid. Two-dimensional numerical simulations are performed. *Directory:* **archive/DDJ/2000/papers/note-lift-off/VE-single-lift.doc** *Note:*	Record Place: 287
2001 Submitted: 2000 ***Int. J. Multiphase Flow*** Editor: Vol: **27** Issue:**10** Pages: **1659-1684**	**Modeling and numerical simulation of particulate flows by the Eulerian-Lagrangian approach** N.A. Patankar, D.D. Joseph *Keywords:* *Abstract:* In this paper we present an Eulerian-Lagrangian numerical simulation (LNS) scheme for particulate flows. The overall algorithm in the present approach is a variation of the scheme presented earlier by N. Patankar and Joseph (1999). In this numerical scheme *Directory:* **archive/DDJ/2001/papers/ModelingE-L/MOD_pap.doc and MOD_figs.pdf** *Note:* Prev title: Modeling and numerical simulation of particulate flows by the Eulerian-Lagrangian TECHNIQUE. ISSN 0301-9322	Record Place: 286
Oct **2001** Submitted: 2000 ***Int. J. Multiphase Flow*** Editor: Vol: **27** Issue:**10** Pages: **1685-1706**	**Lagrangian numerical simulation of particulate flows** N.A. Patankar, D.D. Joseph *Keywords:* *Abstract:* The Lagrangian numerical simulation (LNS) scheme presented in this *Directory:* **archive/DDJ/2001/papers/LagrangianNS/LNS_pap.doc** *Note*	Record Place: 285
Oct **2001** Submitted: 2000 ***J. Fluid Mech.*** Editor: Vol: **445** Issue: Pages: **263-283**	**Viscous potential flow analysis of Kelvin-Helmholtz instability in a channel** T. Funada, D.D. Joseph *Keywords:* *Abstract:* We study the stability of stratified gas-liquid flow in a horizontal rectangular channel using viscous potential flow. The analysis leads to an explicit dispersion relation in which the effects of surface tension and viscosity on the normal stress are not... *Directory:* **archive/DDJ/2000/papers/KHinstable/khinstabL.-- (long version)**	Record Place: 284

	khinstabL.-- (pub'd version) *Note:*	
2001 Submitted: 1999 ***J. Fluid Mech.*** Editor: Vol: **434** Issue: Pages: **23-37**	**Modeling Rayleigh-Taylor instability of a sedimenting suspension of several thousand circular particles in direct numerical simulation** T.W. Pan, D.D. Joseph, R. Glowinski *Keywords:* *Abstract:* In this paper we study the sedimentation of several thousand circular particles in 2D using the method of distributed Lagrange multipliers for solid-liquid flow. The simulation gives rise to *Directory:* **/archive/DDJ/2000/papers/RTI-severalThou/RTI-thou.-- [DDJ/1999/papers/ModelingRTI_DNS/]** *Note:* first title: Modeling Rayleigh-Taylor instability of a sedimenting suspension arising in direct numerical simulation (1999, Glowinski, Pan, Joseph)	Record Place: 283
2001 Submitted: 1999 ***J. Comput. Phys.*** Editor: Vol: **169** Issue: Pages: **363-426**	**A fictitious domain approach to the direct numerical simulation of incompressible viscous flow past moving rigid bodies: Application to particulate flow** R. Glowinski, T.W. Pan, T.I. Hesla, D.D. Joseph, J. Periaux *Keywords: fictitious domain methods, finite element methods, distributed Lagrange multipliers, Navier-Stokes equations, particulate flow, liquid-solid mixtures, store separation, sedimentation, fluidization, Rayleigh-Taylor instabilities* *Abstract:* In this article we discuss a methodology allowing the direct numerical simulation of incompressible viscous fluid flow past moving rigid bodies. The simulation methods rest essentially on the combination of: 1)Lagrange multiplier based FDM 2) finite eleme *Directory:* **JCompPhys.01.169.FDAprchAplctn.pdf (contact Glowinski or Pan.)** *Note:* Glowinski or Pan is corresponding author.	Record Place: 282
2001 Submitted: ***J. Tribology*** Editor: Vol: **123** Issue: Pages: **742-754**	**Flow and stress induced cavitation in a journal bearing with axial throughput** A. Pereia, G. McGrath, D.D. Joseph *Keywords:* *Abstract:* The problem of predicting flow between rotating eccentric cylinders with axial throughput is studied. The system models a device used to test the stability of emulsions against changes in drop size distribution. The analysis looks for the major variation *Directory:* **archive/Intevep/2000/papers/FlowstressRev/FlowstrsRev.--** *Note:* Prev title: Simulation of Flow and stress fields for rotating eccentric cylinders with axial throughput. Armando Pereira with AEM, later with PDVSA Intevep SA, VZ. G. McGrath with PDVSA Intevep SA, VZ.	Record Place: 281
2000 Submitted: ***The Mathematics of Finite Elements and Applications X*** Editor: J.R. Whiteman, ed., Elsevier, Amsterdam, Vol: Issue: Pages: **1-28**	**Fictitious domain methods for particulate flow in two and three dimensions** R. Glowinski, T.W. Pan, D.D. Joseph *Keywords:* *Abstract:* In this article we discuss a methodology allowing the direct numerical simulation of the flow of mixtures of rigid solid particles and incompressible viscous fluids, possibly non-Newtonian. The simulation methods rest essentially on the combination of .. *Directory:* **archive/DDJ/1999/papers/ MAFELAP99.FDM_in2-3D.--** *Note:* Fourth Zienkiewicz Lecture, presented by Prof Glowinski	Record Place: 280
2000 Submitted: 1999 ***Experiments in Fluids*** Editor: Vol: **29** Issue:**3** Pages: **215-227**	**Rotating cylinder drag balance with application to riblets** T. Hall, D.D. Joseph *Keywords:* *Abstract:* Experimental results are reported and discussed for a rotating cylinder drag balance designed to predict drag reduction by surfaces like riblets. The apparatus functions by measuring the torque applied to the inner cylinder by a fluid, such as water, .. *Directory:* **archive/DDJ/2000/papers/ExpFluids00.29.3.215.pdf** *Note:* Tim Hall at AEM. (c) Springer-Verlag	Record Place: 279
2000 Submitted: 1999 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **91** Issue: Pages: **165-188**	**A distributed Lagrange multiplier/fictitious domain method for viscoelastic particulate flows** P. Singh, D.D. Joseph, T.I. Hesla, R. Glowinski, T.W. Pan *Keywords: distributed Lagrange multiplier/fictitious domain method, Oldroyde-B fluid, viscoelastic particulate flows* *Abstract:* A distributed Lagrange multiplier/fictitious domain method (DLM) is developed for simulating the motion of rigid particles suspended in the Oldroyd-B fluid. This method	Record Place: 278

	is a generalization of the one described in [--IJMF 1998, 25, 755- 794] where the motion *Directory:* **archive/DDJ/2000/papers/DLM-ParticulateFlows/DLM-viscoelastic.--** *Note:* Corresponding author either Singh or Pan.	
2000 Submitted: ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **94** Issue:**2-3** Pages: **179-203**	**Sedimentation of a sphere near a wall in an Oldroyd-B fluid** P. Singh, D.D. Joseph *Keywords:* *Abstract:* A code based on the distributed Lagrange multiplier/fictitious domain method (DLM) is used to study the motion of a sphere sedimenting in a viscoelastic liquid near a vertical wall. The viscoelastic liquid is assumed to be shear thinning and modeled by a shear-thinning Oldroyd-B model. Our simulations show that when the Deborah number based on the sphere velocity is O(1) and its initial position is sufficiently close to the wall, it moves towards the wall. *Directory:* **archive/DDJ/2000/papers/spheresVertWall/sedimentation.--** *Note:* Also Univ. MN Supercomputing IRR 2000/90, May 2000.	Record Place: 277
2000 Submitted: 1999 ***Polymer*** Editor: Vol: **41** Issue:**17** Pages: **6683-6689**	**High temperature interfacial tension measurements of PA6/PP interfaces compatibilized with copolymers using a spinning drop tensiometer** C. Verdier, H.T.M. Vinagre, M. Piau, D.D. Joseph *Keywords: interfacial tension, copolymer, spinning drop tensiometer* *Abstract:* Interfacial tension measurements of polyamide/polypropylene (PA6/PP) interfaces are reported at high temperature, using a spinning drop tensiometer, especially adopted to the study of the effects of copolymers. Copolymers in different amounts are included *Directory:* **archive/DDJ/1999/papers/PA6PP_interfacial/PA6PP_interfacial.--** *Note:* Claude Verdier and Monique Piau at Laboratoire de Rheologie, Universite Grenoble I, Institut National Polytechnique de Grenoble, CNRS, France. Harry TM Vinagre at AEM. (c) Elsevier Science Ltd.	Record Place: 276
2000 Submitted: 1999 ***Int. J. Multiphase Flow*** Editor: Vol: **26** Issue:**9** Pages: **1509-1524**	**A new formulation of the distributed Lagrange multiplier/fictitious domain method for particulate flows** N.A. Patankar, P. Singh, D.D. Joseph, R. Glowinski, T.-W. Pan *Keywords:* *Abstract:* A Lagrange-multiplier-based fictitious-domain method (DLM) for the direct numerical simulation of rigid particulate flows in a Newtonian fluid was presented previously. An important feature of this finite element based method is that the flow in the particle domain is constrained to be a rigid body motion by using a well-chosen field of Lagrange multipliers. The constraint of rigid body motion is represented by u=U+ omega ? r; u being the velocity of the fluid at a point in the particle domain; *Directory:* **/archive/DDJ/1999/papers/newlagrange/newformDLM.--IJMF2000.26-newDLM.--** *Note:*	Record Place: 275
2000 Submitted: 1999 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **90** Issue: Pages: **159-185**	**Effects of shear thinning on migration of neutrally buoyant particles in pressure driven flow of Newtonian and viscoelastic fluids** P.Y. Huang, D.D. Joseph *Keywords: shear thinning, viscoelastic fluid, pressure driver flow* *Abstract:* The pattern of cross streaming migration of neutrally buoyant particles in a pressure driven flow depends strongly on the properties of the suspending fluid. These migration effects have been studied by direct numerical simulation in planar flow. *Directory:* **00_1** *Note:* Also as Reprint, Univ. Minnesota Supercomputing Institute Research Report, UMSI 99/100 May 1999	Record Place: 274
2000 Submitted: 1998 ***Int. J. Multiphase Flow*** Editor: Vol: **26** Issue: Pages: **1469-1491**	**Steady flow and interfacial shapes of a highly viscous dispersed phase** R. Bai, D.D. Joseph *Keywords:* *Abstract:* A perturbation theory for the steady flow of immiscible liquids is developed when the dispersed phase is much more viscous than the continuous phase, as is the case in emulsions of highly viscous bitumen in water and in water lubricated pipelines of heavy *Directory:* **archive/ddj/1998/papers/BaiinterfacialLTX/, archive/docs/IJMF.26-Steady Flow.--** *Note:* Similar title, but different material, than published in book, Fluid Dynamics of Interfaces (Cambridge Press)	Record Place: 273
2000 Submitted:	**A distributed Lagrange multiplier/fictitious domain method for the simulation of flows around moving rigid bodies: Application to**	Record Place: 272

Comput. Methods Appl. Mech. Engrg. Editor: Vol: **184** Issue:**2-4** Pages: **241-267**	**particulate flow** R. Glowinski, T.W. Pan, T.I. Hesla, D.D. Joseph, J. Periaux *Keywords:* *particulate flow, fictitious domain methods, Navier-Stokes equations, liquid-solid mixtures, Rayleigh-Taylor instabilities* *Abstract:* In this article we discuss the application of a Lagrange multiplier based fictitious domain method to the numerical simulation of incompressible viscous flow modeled by the Navier-Stokes equations around moving rigid bodies; the rigid body motion is due.. *Directory:* http://www.elsevier.com/locate/cma *Note:* Pan corspdg auth. Roland Glowinski, Tsorng-Whay Pan at Dept Math, Univ. Houston, Houston TX 77204. Jacques Periaux at Dassault Aviation, 78, Quai Marcel Dassault, 92314 Saint-Cloud, France. (c) Elsevier Sciences SA	
1999 Submitted: 1998 ***Int. J. Numer. Meth. Fluids*** Editor: Vol: **30** Issue: Pages: **1043-1066**	**A distributed Lagrange multiplier/fictitious domain method for flows around moving rigid bodies: application to particulate flow** R. Glowinski, T.W. Pan, T.I. Hesla, D.D. Joseph, J. Periaux *Keywords:* *particulate flow, fictitious domain method, Navier-Stokes equations* *Abstract:* This article discusses the application of a Lagrange multiplier-based fictitious domain method to the numerical simulation of incompressible viscous flow modeled by the Navier-Stokes equations around moving rigid bodies; the rigid body motions are due... *Directory:* **99_10** *Note:* Glowinski corresp author (sabbatical at Paris?) and Tsorng-Whay Pan at Dept Math, Univ. Houston, Houston, TX 77204. Todd I Hesla, DDJ at AEM. Jacques Periaux at Dassault Aviation, 92214 Saint-Cloud, France.	Record Place: 271
1999 Submitted: 1998 ***Int. J. Multiphase Flow*** Editor: Vol: **25** Issue: Pages: **1263-1303**	**Breakup of a liquid drop suddenly exposed to a high-speed airstream** D.D. Joseph, J. Belanger, G.S. Beavers *Keywords:* *drop breakup, high-speed airstream, viscous drops, viscoelastic drops* *Abstract:* The breakup of viscous and viscoelastic drops in the high speed airstream behind a shock wave in a shock tube was photographed with a rotating drum camera giving one photograph every 5 us. From these photographs we created movies of the fragmentation... *Directory:* **archive/DDJ/1999/proposals/breakupspring99/breakup99.—** *Note:*	Record Place: 270
1999 Submitted: 1998 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **88** Issue: Pages: **173-184**	**Lift on a sphere near a plane wall in a second-order fluid** H.H. Hu, D.D. Joseph *Keywords:* *lift, sphere near a wall, second-order fluid, resuspension* *Abstract:* In this paper, we examine the lift on a sphere moving very close to an infinite plane wall in a shear flow of a second-order fluid. The sphere is allowed to both translate and rotate along the plane. We focus on the limit when the sphere touches the wall. *Directory:* **archive/DDJ/1998/Papers/LiftMAC/LiftOct98.--** *Note:* published version a little different than archived version.	Record Place: 269
1999 Submitted: 1998 ***Int. J. Multiphase Flow*** Editor: Vol: **25** Issue:**5** Pages: **755-794**	**A distributed Lagrange multiplier/fictitious domain method for particulate flows** R. Glowinski, T.-W. Pan, T.I. Hesla, D.D. Joseph *Keywords:* *particulate flow, solid-liquid flow, fictitious-domain method, distributed Lagrange multiplier, combined equation of motion, operator splitting, finite element* *Abstract:* A new Lagrange-multiplier based fictitious-domain method is presented for the direct numerical simulation of viscous incompressible flow with suspended solid particles. The method uses a finite- element discretization in space and an operator-splitting technique for discretization in time. The linearly constrained quadratic minimization problems which arise from this splitting are solved using conjugate-gradient algorithms. *Directory:* http://www.elsevier.com/locate/ijmulflow *Note*	Record Place: 268
1999 Submitted: 1997 ***J. Fluid Mech.*** Editor: Vol: **386** Issue: Pages: **127-148**	**Self-lubricated transport of bitumen froth** D.D. Joseph, R. Bai, C. Mata, K. Sury, C. Grant *Keywords:* *Abstract:* Bitumen froth is produced from the oil sands of Athabasca using the Clark's Hot Water Extraction process. When transported in a pipeline, water present in the froth is released in regions of high shear; namely, at the pipe wall. This results in a lubrica *Directory:* **archive/syncrude/1998/papers/selfLubAug98MAC, SelfLubNov98MAC.-- archive/syncrude/1997/papers/bitumen97Mac/bitumen.--** *Note:* Runyuan Bai, Clara Mata at AEM. Ken Sury and Chris Grant at Syncrude Ltd., Edmonton Research Centre, Edmonton, Alberta T6N 1H4, Canada	Record Place: 267

1999 Submitted: 1997 ***Int. J. Multiphase Flow*** Editor: Vol: **25** Issue: Pages: **63-85**	**Foam control using a fluidized bed of hydrophobic particles** C. Mata, D.D. Joseph *Keywords:* *foam suspression, fluidized bed, hydrophobic particles* *Abstract:* Applications of foams and foaming are found in many industries like the flotation of minerals, enhanced oil recovery, drilling in oil reservoirs, insulation, construction and refining processes such as Vacuum distillation and Delay-Coker reactors. *Directory:* **archive/intevep/1997/papers/MatasDDJFoamMac/~/mataddjfoam.pdf** *Note:*	Record Place: 266
1999 Submitted: ***Proceedings of MAFELAP 1999, UK*** Editor: Vol: Issue: Pages:	**Fictitious domain methods for particulate flow in two and three dimensions** R. Glowinski, T.W. Pan, D.D. Joseph *Keywords:* *Abstract:* In this article we discuss a methodology allowing the direct numerical simulation of the flow of mixtures of rigid solid particles and incompressible viscous fluids, possibly non-Newtonian. The simulation methods rest essentially on the combination of .. *Directory:* **archive/DDJ/1999/papers/ MAFELAP99.FDM_in2-3D.--** *Note:*	Record Place: 265
1999 Submitted: ***Fluid Dynamics of Interfaces*** Editor: Wei Shyy, Ranga Narayanan, Cambridge University Press, UK Vol: Issue: Pages: **254-261**	**Interfacial shapes in the steady flow of a highly viscous dispersed phase** D.D. Joseph, R. Bai *Keywords:* *Abstract:* A perturbation theory for the steady flow of immiscible liquids is developed when the dispersed phase is much more viscous than the continuous phase, as is the case in emulsions of highly viscous bitumen in water and in water lubricated pipelines of heavy *Directory:* **archive/ddj/1998/papers/BaiinterfacialLTX/~/BaiInterface.--** **[archive/ddj/1997/papers /InterfacialLTX/~/interfacial97.--]** *Note:* SIMILAR title: (IJMF 2000, 26, 1469-1491) Steady flow and interfacial shapes of a highly viscous dispersed phase. 1997 unpublished version w/ DDJ only.	Record Place: 264
1998 Submitted: 1997 ***IUTAM Symposium on Lubricated Transport of Viscous Materials*** Editor: H. Ramkissoon, ed. Vol: Issue: Pages: **65-84**	**Levitation of core flows** C. Mata, R. Bai, D.D. Joseph *Keywords:* *Abstract:* A simple model is proposed for a 2D horizontal core annular flow in which the effect of gravity due to the difference in the densities of the two fluids is the eccentricity of the core. We split the domain through the center of the core; we characterized *Directory:* **98_10** *Note:* (c) Kluwer Academic Publishers, printed in Netherlands	Record Place: 263
1998 Submitted: ***Lecture at IUTAM Symposium on Lubricated Transport of Viscous Materials, Tobago, Jan 7, 1997*** Editor: H. Ramkissoon, ed. Vol: Issue: Pages: **1-24**	**Lubricated transport of viscous materials** D.D. Joseph *Keywords:* *Abstract:* 1. Phase arrangements. In two-phase flows the dynamic response is tied to the way the phases are arranged. Many configurations are realized in practice; these are often described by flow charts for a) Liquid-liquid b) Gas-liquid c) Liquid-solid. 2. Types of *Directory:* *Note:* (c) Kluwer Academic Publishers, printed in Netherlands	Record Place: 262
1998 Submitted: 1998 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **79** Issue: Pages: **157-171**	**Delayed-die swell and sedimentation of elongated particles in wormlike micellar solutions** M. Cloitre, T. Hall, C. Mata, D.D. Joseph *Keywords:* *delayed-die swell, viscoelastic, sedimentation, elongated particles, wormlike micellar solutions* *Abstract:* It has been recently proposed that the combined action of inertia and nonlinear viscoelasticity may be the origin of very peculiar behaviors with dramatic changes of flow type. Two examples are the problem of delayed die swell and the orientation of elon *Directory:* **archive/ddj/1998/papers/DieSwellMay98Mac/~/DieSwellMay98.--** *Note:* M Cloitre at Laboratoire Mixte CNRS-ELF ATOCHEM, 95 Rue Danton, 92303, Levallois-Perret, France. Others at AEM	Record Place: 261
1998	**Cavitation and the state of stress in a flowing liquid**	Record Place:

Submitted: 1997 ***J. Fluid Mech.*** Editor: Vol: **366** Issue: Pages: **367-378**	D.D. Joseph *Keywords:* *Abstract:* The problem of the inception of cavitation is formulated in terms of a comparison of the breaking strength or cavitation threshold at each point of a liquid sample with the principal stresses there. A criterion of maximum tension is proposed which unifies *Directory:* **archive/ddj/1997/papers/CavitationLTX/~/DecCavitation.--** *Note*	260
1998 Submitted: 1997 ***J. Fluid Mech.*** Editor: Vol: **362** Issue: Pages: **297-325**	**Direct simulation of the sedimentation of elliptic particles in Oldroyd-B fluids** P.Y. Huang, H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* Cross-stream migration and stable orientations of elliptic particles falling in an Oldroyd-B fluid in a channel are studied. We show that the normal component of the extra stress on a rigid body vanishes; lateral forces and torque are determined by ... *Directory:* **archive/ddj/1997/papers/EllipseMac/~/ellipse-*.--** *Note*	Record Place: 259
1998 Submitted: 1996 ***Int. J. Multiphase Flow*** Editor: Vol: **24** Issue:**1** Pages: **1-16**	**How bubbly mixtures foam and foam control using a fluidized bed** J. Guitian, D.D. Joseph *Keywords: fluidized bed, foam, bubbly mixture* *Abstract:* In hydrocracking and other foaming reactors, the foam rises to the top because it has a higher gas fraction than the bubbly mixture from which it comes. The high gas hold-up in foams is undesirable in chemical reactors because it strongly decreases ... *Directory:* **/archive/intevep/1997/papers/BubbleReactorGuittianLTX/~/bubblesinglecolumn .--** *Note:* Jose Guitian with Intevep SA, Los Teques, VZ. (c) Elsevier Science Ltd., Pergamon Press. Printed in Great Britain	Record Place: 258
Oct. 26 **1998** Submitted: ***Oil & Gas Journal*** Editor: Vol: Issue: Pages: **59-68**	**Drive to produce heavy crude prompts variety of transportation methods** G.A. Nunez, H.J. Rivas, D.D. Joseph *Keywords:* *Abstract:* Increasing oil demand has been driving development of the world's large resources of heavy oil and bitumen, more than 70% of which are in Canada and Venezuela. Moving these heavy crudes and bitumens to market requires alternative pipeline transportation *Directory:* **98_6** *Note:* Gustavo A Nunez and HJ Rivas at PDVSA-Intevep, Caracas, VZ.	Record Place: 257
1998 Submitted: ***Contemporary Mathematics*** Editor: Vol: **218** Issue: Pages: **121-137**	**A fictitious domain method with distributed Lagrange multipliers for the numerical simulation of particulate flow** R. Glowinski, T.-W. Pan, T.I. Hesla, D.D. Joseph, J. Periaux *Keywords:* *Abstract:* The main goal of this article, which generalizes [Glowinski et al 1997] considerably, is to discuss the numerical simulation of particulate flow for mixtures of incompressible viscous fluids and rigid particles. Such flow occurs in liquid/solid fluidized *Directory:* **98_5** *Note:* (c) American Mathematical Society	Record Place: 256
1997 Submitted: ***in Computational Science for the 21st Century*** Editor: M.-O. Bristeau, G. Etgen, W. Fitzgibbon, J.L. Lions, J. Periaux, M.F. Wheeler eds. Vol: Issue: Pages: **270-279**	**Distributed Lagrange multiplier methods for particulate flows** R. Glowinski, T. Hesla, D.D. Joseph, T.W. Pan, J. Periaux *Keywords:* *Abstract:* In this article we discuss the application of a Lagrange multiplier based fictitious domain method to the numerical simulation of incompressible viscous flow modeled by the Navier-Stokes equations around moving bodies. The solution method combines finite element approximations, time discretization by operator splitting and conjugate gradient algorithms for the solution of the linearly constrained quadratic minimization problems coming from the splitting method. The results of numerical experiments for two sedimenting cylinders in a two-dimensional channel are presented. *Directory:* **97_1** *Note:* John Wiley & Sons, Chichester, England	Record Place: 255
1997 Submitted: 1996 ***J. Non-Newtonian Fluid Mech.***	**Steep wave fronts on extrudates of polymer melts and solutions: lubrication layers and boundary lubrication** D.D. Joseph	Record Place: 254

Editor: Vol: **70** Issue: Pages: **187-203**	*Keywords:* *polymer melts, lubrication layers, boundary lubrication* *Abstract:* Steep wave fronts tend to develop in many regimes of lubricated, slipping flows in which waves appear. Problems of slip, spurt, fracture and extrudate distortion can be framed in terms of lubrication theory with paradigms arising from the lubrication ... *Directory:* **archive/ddj/1996/papers /SteepWaveLubricationLTX/~/steepwavelub.--, steepwave.--** *Note:*	
1997 Submitted: 1996 ***J. Fluid Mech.*** Editor: Vol: **343** Issue: Pages: **73-94**	**Direct simulation of the motion of solid particles in Couette and Poiseuille flows of viscoelastic fluids** P.Y. Huang, J. Feng, H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* This paper reports the results of direct numerical simulation of the motion of a two-dimensional circular cylinder in Couette flow and in Poiseuille flow of an Oldroyd-B fluid. Both neutrally buoyant and non-neutrally buoyant cylinders are considered. *Directory:* **/archive/ddj/1996/papers /DirectSimParticlesMac/~/directsimparticles.--** *Note:*	Record Place: 253
1997 Submitted: 1995 ***Powder Technology*** Editor: Vol: **94** Issue: Pages: **211-215**	**Lubricated pipelining** D.D. Joseph *Keywords:* *lubricated pipelines, flow, core flow, oil-water flow* *Abstract:* This paper gives a brief overview of the issues posed by the science and technology for transporting heavy oils in a sheath of lubricating water. It touches on measures of energy efficiency, industrial experience, fouling, models of levitation, and future *Directory:* **/archive/ddj/1996/papers/LubricatedPipeliningMac/~/lubricatedpipelining.--** *Note:* (c) Elsevier Science SA, New York, NY. SEE ALSO Core Annular Flows, (CV248) Annual Reviews of Fluid Mech., 1997	Record Place: 252
1997 Submitted: 1995 ***J. Fluid Mech.*** Editor: Vol: **342** Issue: Pages: **37-51**	**Sidewall effects in the smoothing of an initial discontinuity of concentration** T.Y. Liao, D.D. Joseph *Keywords:* *Abstract:* The velocity field of a binary mixture of incompressible miscible liquids is non-solenoidal when the densities of the two liquids are different. If the mixture density is linear in the volume fraction, as in the case of simple (ideal) mixtures or...glycer *Directory:* **archive/ddj/1997/papers/SidewallWIN/~/sidewall.--** *Note:* TY Liao at HPCERC/ARC, Univ. of New Mexico, Albuquerque, NM 87131	Record Place: 251
1997 Submitted: ***J. Fluids Engineering*** Editor: Vol: **119** Issue: Pages: **497-498**	**Technical Forum- Questions in fluid mechanics: Understanding foams and foaming** D.D. Joseph *Keywords:* *Abstract:* Foams are common, complex, and not well understood. Most of the common foams are a two-phase medium of gas and liquid with a particular structure consisting of gas pockets trapped in a network of thin liquid films and Plateau borders. *Directory:* **archive/intevep/1997/memos/QuestionFoamsWIN /people/faculty/joseph/archive/docs/questionsfoams.--, [full version: /archive/intevep/1997/papers/UnderstandFoamsLTX/~/understandfoams.--]** *Note:*	Record Place: 250
1997 Submitted: ***Annu. Rev. Fluid Mech.*** Editor: Vol: **29** Issue: Pages: **65-90**	**Core-annular flows** D.D. Joseph, R. Bai, K.P. Chen, Y.Y. Renardy *Keywords:* *Abstract:* This paper gives an overview of the issues posed by the science and technology of transporting heavy oils in a sheath of lubricating water. It touches on measures of energy efficiency, industrial experience, fouling, stability, models of levitation, ... *Directory:* **/archive/ddj/1996/papers/CoreAnnularMac/~/coreannular.--** *Note:* KP Chen at Dept of Mech. Aerospace Engrg, Arizona State Univ., Tempe, AZ 85287; YY Renardy at Dept Math, Virginia Polytechnic Inst. State Univ., Blacksburg, VA 24061	Record Place: 249
1996 Submitted: 1996 ***J. Non-Newtonian Fluid Mech.*** Editor:	**A note on the forces that move particles in a second-order fluid** D.D. Joseph, J. Feng *Keywords:* *forces, second-order fluid* *Abstract:* In this note we show that the normal stresses on a solid body in plane flow of a	Record Place: 248

Vol: **64** Issue: Pages: **299-302**	second-order fluid are compressive and such as to turn long bodies into the stream and to cause circular particles to aggregate and chain. *Directory:* **cdrom/docs/secondorderforces.--** *Note:*	
1996 Submitted: 1995 ***J. Rheol.*** Editor: Vol: **40** Issue:**2** Pages: **317-320**	**Letter to the Editor: Steep wave fronts on extrudates of polymer melts and solutions** D.D. Joseph, Y.J. Liu *Keywords:* *Abstract:* It seems to us that the shape of the extrudate of polymers and polymer melts is very much like the wavy shapes one sees in core-annular flows of heavy oils in water. These flows are lubricated by the water and can be said to give rise to slip. *Directory:* **96_13, archive/DDJ/1995/ExtrudatePolymers/J-Rheol96.40.2/** *Note:* Y. Joe Liu at AEM	Record Place: 247
1996 Submitted: 1995 ***Int. J. Multiphase Flow*** Editor: Vol: **22** Issue:**6** Pages: **1205-1222**	**Infiltration of initially dry, deformable porous media** L. Preziosi, D.D. Joseph, G.S. Beavers *Keywords: deformable porous media, composites manufacturing* *Abstract:* The present paper studies the infiltration of an incompressible liquid in an initially dry (or partially dry), deformable spongeous material made of an incompressible constituent in the slug-flow approximation having in mind the application to some indust *Directory:* **archive/ddj/1996/papers/InfiltrationLTX/zsourcefiles/infiltration.--** *Note:* L Preziosi at Dipartimento di Matematica, Politecnico, Corso Duca degli. Abruzzi 24, Torino, 10129, Italy	Record Place: 246
1996 Submitted: 1995 ***Int. J. Multiphase Flow*** Editor: Vol: **22** Issue:**6** Pages: **1247-1254**	**Stability of annular flow and slugging** D.D. Joseph, A.C. Bannwart, Y.J. Liu *Keywords: annular gas-liquid flow, stability criterion, transition, slugging, core flow* *Abstract:* In this work we propose an effective viscosity criterion for the stabilization of annular gas-liquid and liquid-particle flows and an inertial mechanism which drives waves into slugs in slugging gas-liquid flows. Annular flow is stable when the fluid.. *Directory:* **archive/ddj/1996/papers/StableAnnularMac/** *Note:* YJ Liu now at 3M corporation, 3M Center, 236-2S-12, St Paul, MN 55144	Record Place: 245
1996 Submitted: 1995 ***J. Fluid Mech.*** Editor: Vol: **324** Issue: Pages: **199-222**	**The motion of solid particles suspended in viscoelastic liquids under torsional shear** J. Feng, D.D. Joseph *Keywords:* *Abstract:* This paper presents an experimental study of the behavior of single particles and suspensions in polymer solutions in a torsional flow. Four issues are investigated in detail: the radial migration of a spherical particle; the rotation and migration of.. *Directory:* **96_7** *Note:*	Record Place: 244
1996 Submitted: 1995 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **63** Issue: Pages: **63-88**	**Dynamic simulation of sedimentation of solid particles in an Oldroyd-B fluid** J. Feng, P.Y. Huang, D.D. Joseph *Keywords: dynamic simulation, Oldroyd-B fluid, sedimentation, solid particles* *Abstract:* In this paper we present a two-dimensional numerical study of the viscoelastic effects on the sedimentation of particles in the presence of solid walls or another particle. The Navier-Stokes equations coupled with an Oldroyd-B model are solved using a ... *Directory:* **96_6** *Note:* Jimmy Feng now at Dept of Chem. Engineering, Univ. of Calif, Santa Barbara, CA 93106	Record Place: 243
1996 Submitted: 1995 ***J. Rheol.*** Editor: Vol: **40** Issue:**3** Pages: **405-423**	**Flow characteristics of concentrated emulsions of very viscous oil in water** G.A. Nunez, M. Briceno, C. Mata, H. Rivas, D.D. Joseph *Keywords:* *Abstract:* This paper advances ideas and presents experiments on the flow characteristics of concentrated emulsions of Venezuelan bitumen in water plus surfactant. These emulsions are studied under a variety of flow conditions, namely between rotating cylinders, .. *Directory:* **archive/DDJ/1996/Papers/FlowCharact/Emulsion_Paper.—** *Note:* Gustavo A Nunez, Maria Briceno, Clara Mata and Hercilio Rivas at Intevep SA, Los Teques, VZ. (c) The Society of Rheology, Inc	Record Place: 242
1996 Submitted: 1995	**Direct simulation of interfacial waves in a high-viscosity-ratio and axisymmetric core-annular flow**	Record Place: 241

J. Fluid Mech. Editor: Vol: **327** Issue: Pages: **1-34**	R. Bai, K. Kelkar, D.D. Joseph *Keywords:* *Abstract:* A direct numerical simulation of spatially periodic wavy core flows is carried out under the assumption that the densities of the two fluids are identical and that the viscosity of the oil core is so large that it moves as a rigid solid which may neverth *Directory:* **cdrom/docs/pipelinesymp.--, archive/DDJ/1995/PipelineSymp95/zsourcefiles/PipelineSymp95.doc** *Note:* Runyuan Bai at AEM; Kanchan Kelkar at Innovative Research, Inc. 2800 Univ. Ave SE, Mpls, MN 55414	
1996 Submitted: 1995 ***J. Fluid Mech.*** Editor: Vol: **318** Issue: Pages: **223-236**	**Vaporization of a liquid drop suddenly exposed to a high-speed airstream** D.D. Joseph, A. Huang, G.V. Candler *Keywords:* *Abstract:* Many studies of fragmentation of liquid drops at supersonic Mach numbers report the appearance of large amounts of mist. Photographs from other studies, which do not mention mist at all, strongly suggest that copious amounts of mist are formed at the earliest stages of fragmentation. In this paper, we present arguments and calculations which indicate that this mist is formed from condensed vapour arising from the flash vaporization of the hot and low-pressure liquid on the leeside of the drop. *Directory:* **96_2** *Note:* all at AEM	Record Place: 240
1996 Submitted: 1994 ***J. Fluid Mech.*** Editor: Vol: **315** Issue: Pages: **367-385**	**The motion of a solid sphere suspended by a Newtonian or viscoelastic jet** J. Feng, D.D. Joseph *Keywords:* *Abstract:* This paper describes experimental observations of a solid sphere suspended by a vertical or inclined jet. A laminar Newtonian jet is able to suspend a sphere only through viscous entrainment at low Reynolds numbers (Re~10). A turbulent Newtonian jet.. *Directory:* **96_8** *Note:*	Record Place: 239
1996 Submitted: 1994 ***Int. J. Multiphase Flow*** Editor: Vol: **22** Issue:**2** Pages: **207-221**	**Cement-lined pipes for water lubricated transport of heavy oil** M.S. Arney, G.S. Ribeiro, E. Guevara, R. Bai, D.D. Joseph *Keywords: core-annular flow, oil fouling, cement-lined pipes, heavy crude oils* *Abstract:* This paper presents different strategies for preventing oil from fouling the walls of core-annular flow pipelines and also for restart from an unexpected pipeline shut-down. The most promising of these strategies is to use cement-lined pipes. *Directory:* **96_12, pre95/papers/1995/cement-pipeline-paper/Pipeline.--** *Note:* SCAN THIS IN-VERY DIFFERENT FROM DRAFT FILE. GS Ribeiro, with CENPES-PETROBRAS, Rio de Janeiro, Brazil. E Guevara with INTEVEP S.A., Los Teques, VZ	Record Place: 238
1996 Submitted: ***Rheology and Fluid Mechanics of Nonlinear Materials, 1996 ASME Int. Mechanical Engineering Congress and Exposition*** Editor: D.A. Siginer, S.G. Advani, Des Vol: **217** Issue: Pages: **123-133**	**The motion and interaction of solid particles in viscoelastic liquids** J. Feng, D.D. Joseph, P.Y. Huang *Keywords:* *Abstract:* In this paper we present numerical and experimental results on the motion and interaction of solid particles in polymeric fluids. The two-dimensional numerical work investigates the viscoelastic effects on the sedimentation of a particle in the presence.. *Directory:* **96_12** *Note:* J Feng at Dept Chemical Engineering, Univ. California, Santa Barbara, CA 93106	Record Place: 237
1996 Submitted: ***Proc. of the 5th World Congress of Chemical Engineering, Second Particle Technology Forum, San Diego, July 14-18, 1996 AIChE New York*** Editor: Keynote	**Flow induced microstructure in Newtonian and viscoelastic fluids** D.D. Joseph *Keywords:* *Abstract:* Pair interactions between neighboring particles and turning couples on long bodies formed from touching bodies give rise to flow induced microstructures. In Newtonian fluids, pair interactions in a fluidized suspension lead to dispersions with particles.. *Directory:* **archive/ddj/1996/papers/FlowInducedMac** *Note:*	Record Place: 236

presentation (paper 95a), Particle Technology Track Vol: **6** Issue: Pages: **3-16**		
1996 Submitted: ***Physica D*** Editor: Vol: **97** Issue: Pages: **104-125**	**Non-solenoidal velocity effects and Korteweg stresses in simple mixtures of incompressible liquids** D.D. Joseph, A. Huang, H.H. Hu *Keywords:* *Abstract:* We study some basic problems of fluid dynamics of two incompressible miscible liquids modeled as a simple mixture in which the volume of the mixture does not change on mixing. In general, the expansion delta = div u in these problems does not vanish. *Directory:* **96_1, cdrom/docs/nonsolenoidal.-- Also see pre95/papers/1992/nonsolenoid/HH_non-sol_vel.--** *Note:* Adam Huang and Howard Hu at AEM. (Not sure if all material is repeat of 1993 (CV204) or 1992 (CV184) papers	Record Place: 235
1995 Submitted: 1994 ***J. Fluid Mech.*** Editor: Vol: **303** Issue: Pages: **83-102**	**The unsteady motion of solid bodies in creeping flows** J. Feng, D.D. Joseph *Keywords:* *Abstract:* In treating unsteady particle motions in creeping flows, a quasi-steady approximation is often used, which assumes that the particle's motion is so slow that it is composed of a series of steady states. In each of these states, the fluid is in a steady... *Directory:* **96_2** *Note:*	Record Place: 234
1995 Submitted: 1994 ***J. Rheol.*** Editor: Vol: **39** Issue:**2** Pages: **323-343**	**Effective density and viscosity of a suspension** M. Poletto, D.D. Joseph *Keywords:* *Abstract:* This paper presents results of a series of experiments on the settling velocity of spheres in two-component solid-liquid suspensions. Particular emphasis has been given to the effective values of density and viscosity of the mixture which allows us to... *Directory:* **pre95/papers/1995/SuspensionDensity/SuspensionDensityMS.--** *Note:* Massimo Poletto at AEM	Record Place: 233
1995 Submitted: 1994 ***J. Fluid Mech.*** Editor: Vol: **304** Issue: Pages: **321-342**	**A two-dimensional cusp at the trailing edge of an air bubble rising in a viscoelastic liquid** Y.J. Liu, T.Y. Liao, D.D. Joseph *Keywords:* *Abstract:* When an air bubble rises in a viscoelastic fluid there is a critical capillary number for cusping and jump in velocity: when the capillary number is below critical, which is about 1 in our data, there is no cusp at the tail of a (smooth) air bubble. *Directory:* **95_11** *Note:* All at AEM	Record Place: 232
1995 Submitted: 1994 ***Physical Review E*** Editor: Vol: **51** Issue:**3** Pages: **R1649-1650**	**Cavitation in a flowing liquid** D.D. Joseph *Keywords:* *Abstract:* In this paper, I propose that the cavitation threshold in a flowing liquid could be associated with the maximum tension that the fluid can sustain before undergoing cohesive fracture at a certain point. My criterion is not isotropic; I believe that ... *Directory:***archive/ddj/1996/papers/CavitationMac/Cavitation** *Note:* (c) The American Physical Society	Record Place: 231
1995 Submitted: 1994 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **57** Issue: Pages: **313-320**	**The negative wake in a second-order fluid (Short Communication)** D.D. Joseph, J. Feng *Keywords: finite element method, negative wakes, second-order fluid, viscoelastic fluid* *Abstract:* To investigate the origin of negative wakes in viscoelastic fluid, we used a perturbation method to calculate the flow induced by a solid sphere falling slowly through a viscoelastic fluid in a vertical column of square cross-section. *Directory:* **95_6** *Note:* Corrigendum to, The negative wake in a second-order fluid, 1996 Vol 63, pg. 263	Record Place: 230
1995 Submitted: 1994 ***Int. J. Multiphase Flow*** Editor: Vol: **21** Issue:**2**	**Propagation of voidage waves in a two-dimensional liquidfluidized bed** M. Poletto, R. Bai, D.D. Joseph *Keywords: liquid fluidization, homogeneous fluidization, voidage instabilities, nonhomogeneous fluidization, two-dimensional fluidized bed*	Record Place: 229

Pages: **223-239**	*Abstract:* Digital video recordings were used to obtain voidage distribution in a narrow fluidized bed with a small gap slightly larger than three particle diameters. From these recordings we determined auto-corrections and power spectra in spatial and temporal.. *Directory:* **95_5** *Note:* all at AEM	
1995 Submitted: 1994 ***J. Fluid Mech.*** Editor: Vol: **286** Issue: Pages: **201-227**	**Dynamic simulation of the motion of capsules in pipelines** J. Feng, P.Y. Huang, D.D. Joseph *Keywords:* *Abstract:* In this paper we report results of two-dimensional simulations for the motion of elliptic capsules carried by a Poiseuille flow in a channel. The numerical method allows computation of the capsule motion and the fluid flow around the capsule, and accurate *Directory:* **95_3** *Note:*	Record Place: 228
1995 Submitted: 1994 ***J. Fluid Mech.*** Editor: Vol: **282** Issue: Pages: **233-245**	**Stability of eccentric core-annular flow** A. Huang, D.D. Joseph *Keywords:* *Abstract:* Perfect core-annular flows are two-phase flows, for example of oil and water, with the oil in a perfectly round core of constant radius and the water outside. Eccentric core flows can be perfect, but the centre of the core is displaced off the centre ...*Directory:* **95_2** *Note:* all at AEM.	Record Place: 227
1995 Submitted: 1993 ***J. Fluid Mech.*** Editor: Vol: **284** Issue: Pages: **159-169**	**Boundary layer flow of air over water on a flat plate** J.J. Nelson, A.E. Alving, D.D. Joseph *Keywords:* *Abstract:* A non-similar boundary layer theory for air blowing over a water layer on a flat plate is formulated and studied as a two-fluid problem in which the position of the interface is unknown. The problem is considered at large Reynolds number (based on x) .. *Directory:* **95_8** *Note:* JJ Nelson at USAF Wright Laboratories, Wright-Patterson AF Base, OH 45433-7913. A Alving with AEM	Record Place: 226
1995 Submitted: 1993 ***Int. J. Multiphase Flow*** Editor: Vol: **21** Issue:**1** Pages: **1-26**	**Dynamics of fluidized suspensions of spheres of finite size** P. Singh, D.D. Joseph *Keywords: fluidized suspensions, radial and area-averaged distributions, particle phase theories, Hodamard instability, bubbling instability, bounded solutions* *Abstract:* We propose a one-dimensional theory of fluidized suspensions in which the fluids and solids momentum equations are decoupled by using a new mean drag law for the particles. Our mean drag law differs from the standard drag laws frequently used in that... *Directory:* **95_4** *Note:* P Singh at AEM	Record Place: 225
1995 Submitted: 1993 ***J. Fluid Mech.*** Editor: Vol: **283** Issue: Pages: **1-16**	**A three-dimensional computation of the force and torque on an ellipsoid settling slowly through a viscoelastic fluid** J. Feng, D.D. Joseph, R. Glowinski, T.W. Pan *Keywords:* *Abstract:* The orientation of an ellipsoid falling in a viscoelastic fluid is studied by methods of perturbation theory. For small fall velocity, the fluid's Rheology is described by a second-order fluid model. The solution of the problem can be expressed by a dual *Directory:* **95_1** *Note:* R Glowinski and TW Pan at Dept Mathematics, Univ. of Houston, Houston, TX, 77204	Record Place: 224
1995 Submitted: 1993 ***J. of Fluids Engineering*** Editor: Vol: **117** Issue: Pages: **446-449**	**Parallel Pipelining** D.D. Joseph, R. Bai, T.Y. Liao, A. Huang, H.H. Hu *Keywords:* *Abstract:* The use of water as a lubricant to reduce friction in pipelining of heavy crude oil is an old idea which has been used sporadically over the past half century (Joseph and Renardy, 1992). The essence of lubrication is that water forms an annulus around oil *Directory:* **95_20** *Note:* Transactions of the ASME	Record Place: 223
1995 Submitted: ***Proc. 2nd International Conference on***	**Motion of particles settling in a viscoelastic fluid** D.D. Joseph, Y.J. Liu *Keywords:* *Abstract:* In this paper, we will attempt to extract some principles concerning the flow-induced anisotropy which develops in the settling of particles in Newtonian and	Record Place: 222

Multiphase Flow '95 Kyoto, April 3-7, 1995, Kyoto, Japan Editor: Vol: Issue: Pages: **PD1_1-8**	viscoelastic fluids. Our point of view is that the local microstructure, which is determined by *Directory:* **cdrom/docs/japanconf95.--** *Note:*	
1994 Submitted: ***J. Colloid and Interface Sci.*** Editor: Vol: **162** Issue:**2** Pages: **331-339**	**Evolution of a liquid drop in a spinning drop tensiometer** H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* To obtain desired material properties, a blend of two mostly incompatible polymers is often used. The blend morphology developed during the mixing process of molten polymers is strongly influenced by interfacial tension between the polymers. A spinning drop tensiometer is commonly used to measure the interfacial tension between two polymeric liquids. *Directory:* **94_12** *Note:* found with search in Ideal, http://search.idealibrary.com	Record Place: 221
1994 Submitted: 1993 ***J. Fluid Mech.*** Editor: Vol: **277** Issue: Pages: **271-301**	**Direct simulation of initial value problems for the motion of solid bodies in a Newtonian fluid, Part 2, Couette and Poiseuille flows** J. Feng, H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* This paper reports the results of a two-dimensional finite element simulation of the motion of a circular particle in a Couette and a Poiseuille flow. The size of the particle and the Reynolds number are large enough to include fully nonlinear inertial.. *Directory:* **94_9** *Note:*	Record Place: 220
1994 Submitted: 1993 ***J. Rheol.*** Editor: Vol: **38** Issue:**5** Pages: **1251-1270**	**Rod climbing and normal stresses in heavy crude oils at low shears** G.A. Nunez, G.S. Ribeiro, M.S. Arney, J. Feng, D.D. Joseph *Keywords:* *Abstract:* This paper gives the results of a study of the nonlinear viscoelastic behavior of three heavy crude oils from California and Venezuela. A linear combination of normal stress coefficients at zero shear is expressed in terms of the quantity (climbing const *Directory:* **94_8, pre95/papers/1994/RodClimbing/Part I+II.--** *Note:* GA Nunez at Intevep SA-PDVSA, Los Teques, VZ. (c) The Society of Rheology, Inc	Record Place: 219
1994 Submitted: 1993 ***J. Fluid Mech.*** Editor: Vol: **271** Issue: Pages: **1-16**	**The turning couples on an elliptic particle settling in a vertical channel** P.Y. Huang, J. Feng, D.D. Joseph *Keywords:* *Abstract:* We do a direct two-dimensional finite-element simulation of the Navier-Stokes equations and compute the forces which turn an ellipse settling in a vertical channel of viscous fluid in a regime in which the ellipse oscillates under the action of a vortex.. *Directory:* **94_7** *Note:* Peter Y Huang, Jimmy Feng at AEM. (c) Cambridge Univ. Press	Record Place: 218
1994 Submitted: 1993 ***Int. J. Multiphase Flow*** Editor: Vol: **20** Issue:**3** Pages: **481-491**	**Friction factor and holdup studies for lubricated pipelining-- II. Laminar and k-epsilon models of eccentric core flow** A. Huang, C. Christodoulou, D.D. Joseph *Keywords: core, annular, flow, lubricated, pipeline* *Abstract:* A model of core-annular flow in which the oil core is a perfect cylinder with generators parallel to the pipe wall, but off-center, is studied in laminar and turbulent flow to asses the effects of eccentricity and the volume flow rate ratio on ... *Directory:* **94_6** *Note:* (c) Elsevier Science Ltd., Great Britain. Pergamon press	Record Place: 217
1994 Submitted: 1993 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **51** Issue: Pages: **111-124**	**White-Metzner models for rod climbing in A1** T.Y. Liao, H.H. Hu, D.D. Joseph *Keywords: A1, rod climbing, Weissenberg effect, White-Metzner models* *Abstract:* Measurements of rod climbing in A1 give rise to an apparent linear relation between the height rise h and the angular velocity Omega of the rod. We use a White-Metzner model to fit the data & we find that the height rise on the rod deviates from the quadr *Directory:* **94_5** *Note:* HH Hu at Dept of Mech. Engngr and Applied Mech., Univ. of Pennsylvania,	Record Place: 216

	Philadelphia PA 19104	
1994 Submitted: 1993 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **54** Issue: Pages: **45-86**	**Aggregation and dispersion of spheres falling in viscoelastic liquids** D.D. Joseph, Y.J. Liu, M. Poletto J. *Keywords:* *aggregation of spheres, dispersion of spheres, elastic stress ratio, Newtonian liquids, numerical simulation, settling of spheres, sphere-sphere interaction viscoelastic liquids, wall-sphere interaction* *Abstract:* This paper focuses on the settling on one sphere near another or near a wall. We find maximum differences between Newtonian and viscoelastic liquids, with repulsion between nearby bodies in the Newtonian case and attraction in the viscoelastic case. *Directory:* **94_4** *Note:* all at AEM	Record Place: 215
1994 Submitted: 1993 ***J. Fluid Mech.*** Editor: Vol: **261** Issue: Pages: **95-134**	**Direct simulation of initial value problems for the motion of solid bodies in a Newtonian fluid, Part 1, Sedimentation** J. Feng, H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* This paper reports the result of direct simulations of fluid-particle motions in two dimensions. We solve the initial value problem for the sedimentation of circular and elliptical particles in a vertical channel. The fluid motion is computed from ... *Directory:* **94_1 ?** *Note:* J Feng at AEM and MN Supercomputer Inst., Univ. MN. HH Hu at Dept Mech. Engrg & Applied Mech. Univ. Pennsylvania, Philadelphia, PA 19104	Record Place: 214
1994 Submitted: 1992 ***J. Fluid Mech.*** Editor: Vol: **265** Issue: Pages: **1-23**	**Potential flow of viscous and viscoelastic fluids** D.D. Joseph, T.Y. Liao *Keywords:* *Abstract:* Potential flows of incompressible fluids admit a pressure (Bernoulli) equation when the divergence of the stress is a gradient as in inviscid fluids, viscous fluids, linear viscoelastic fluids and second-order fluids. We show that in potential flow without *Directory:* **94_2** *Note:* (c) Cambridge Univ. Press	Record Place: 213
1994 Submitted: ***ASME FED (Liquid-Solid Flows)*** Editor: Vol: **189** Issue: Pages: **31-40**	**Interrogation of numerical simulation for modeling of flow induced microstructure** D.D. Joseph *Keywords:* *Abstract:* This paper summarizes our recent efforts using direct numerical simulations to determine microstructural properties of fluidized suspensions of a few particles. We have been studying the motions of a few particles in a viscous fluid by direct numerical .. *Directory:* **people/faculty/joseph/archive/docs/ASMEconf95.pdf, faculty/joseph/archive/catalog/cdrom/docs/asmeconf95.pdf** *Note:*	Record Place: 212
1994 Submitted: ***Trends and Perspectives in Applied Mathematics, Applied Mathematical Sciences*** Editor: Sirovich, Arnol'd, eds., Springer-Verlag. Also in Army HPCRC preprint 93-010. Vol: **100** Issue: Pages: **1-54**	**Viscous and viscoelastic potential flow** D.D. Joseph, T.Y. Liao *Keywords:* *Abstract:* Potential flows of incompressible fluids admit a pressure (Bernoulli) equation when the divergence of the stress is a gradient as in inviscid fluids, viscous fluids, linear viscoelastic fluids and second-order fluids. We show that the equation balancing.. *Directory:* **pre95/papers/1994/VisPotentialFlow/Part1-Sec1-8.--** *Note:* Army High Performance Computing Research Center, U of M, 1100 Washington Ave S. Minneapolis, MN 55415	Record Place: 211
1993 Submitted: 1993 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **48** Issue: Pages: **225-235**	**Independent confirmation that delayed die swell is a hyperbolic transition** D.D. Joseph, C. Christodoulou *Keywords:* *delayed die swell, hyperbolic transition, wave speeds, Xanthan* *Abstract:* We measured shear wave speeds in the same aqueous Xanthan solutions used to study delayed die swell by Allain, Cloitre, Perrot and Quemada 1993. They reported delayed die swell for solutions of 500, 1000, 2000 and 4000 ppm Xanthan in water when the shear *Directory:* **pre95/papers/1993/Xanthan/XanthanPaper.--** *Note:* (c) Elsevier Science Publishers, BV, Amsterdam	Record Place: 210

1993 Submitted: 1993 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **50** Issue: Pages: **305-329**	**Anomalous rolling of spheres down an inclined plane** Y.J. Liu, J. Nelson, J. Feng, D.D. Joseph *Keywords:* *anomalous (or hydrodynamic) rolling, Newtonian liquids, normal (or dry) rolling, numerical simulation, settling of spheres, viscoelastic liquids* *Abstract:* A sphere in air will roll down a plane which is tilted away from the vertical. The only couple acting about the point of contact between the sphere and the plane is due to the component of the weight of the sphere along the plane, provided that air frict *Directory:* **pre95/papers/1993/AnomalousRolling/AnomalousRollingMS.--** *Note:* Yaoqi Joe Liu, John Nelson, Jimmy Feng at AEM	Record Place: 209
106 **1993** Submitted: 1993 ***J. Rheol.*** Editor: Bingham Award Lecture-1993 Vol: **37** Issue:**6** Pages: **961-983**	**Orientation of long bodies falling in a viscoelastic liquid** D.D. Joseph, Y.J. Liu *Keywords:* *Abstract:* New experiments on the orientation of a cylinder settling in viscoelastic and pseudoplastic fluids are described in an attempt to identify the main mechanisms which control the orientation of the cylinder as it falls. *Directory:* **pre95/papers/1993/** *Note:* Yaoqui Joe Liu at AEM	Record Place: 208
1993 Submitted: 1992 ***J. Fluid Mech.*** Editor: Vol: **255** Issue: Pages: **565-595**	**Sedimentation of particles in polymer solutions** Y.J. Liu, D.D. Joseph *Keywords:* *Abstract:* In this paper, we present detailed and systematic experimental results on the sedimentation of solid particles in aqueous solutions of polyox and polyacrylamide. The tilt angles of long cylinders falling in these viscoelastic liquids were measured. *Directory:* **pre95/1993/paperTilt.--** *Note:* (c) Cambridge Univ. Press	Record Place: 207
1993 Submitted: 1992 ***Int. J. Multiphase Flow*** Editor: Vol: **19** Issue:**6** Pages: **1061-1076**	**Friction factor and holdup studies for lubricated pipelining – I** M.S. Arney, R. Bai, E. Guevara, D.D. Joseph, K. Liu *Keywords:* *core, annular, flow, lubricated, pipeline, two-phase flow* *Abstract:* Results from new experiments on the lubricated pipelining of emulsified waxy crude oil and No. 6 fuel oil are presented and compared with other sources of literature. A correlation formula which estimates the holdup fraction is introduced and evaluated.. *Directory:* **93__3** *Note:* E Guevara at Intevep, SA, San Tome, Venezuela. K Liu with Deltac Corp, Plymouth, MN 55426. (c) Pergamon Press Ltd., Great Britain	Record Place: 206
1993 Submitted: 1991 ***Int. J. Heat Mass Transfer*** Editor: Vol: **36** Issue:**3** Pages: **663-672**	**Stability of liquid-vapor flow down an inclined channel with phase change** A. Huang, D.D. Joseph *Keywords:* *Abstract:* We study the stability of a two-phase flow between heated inclined plates. The temperature of the bottom plate is held below the vaporization temperature and the top plate is hotter than the vaporization temperature. A water film is on the cold wall ... *Directory:* **pre95/papers/1993/Phase-change-2_AH.--** *Note:* Adam Huang at AEM. (c) Pergamon Press Ltd., Great Britain	Record Place: 205
1993 Submitted: ***Proc. of the Symposium on Applied Mathematics at the Turn of the Century*** Editor: Universidad Complutense, Cursos de Verano, Almeria, Spain, July 5-10, 1993, Vol: Issue: Pages:	**Non-solenoidal velocity effects and Korteweg stresses in simple mixtures of incompressible liquids** D.D. Joseph *Keywords:* *Abstract:* *Directory:* *Note:* Title exactly the same as CV 235 and CV 184	Record Place: 204
1993 Submitted: ***J. Colloid Interface Sci.*** Editor: Vol: **158** Issue:**1** Pages: **255-257**	**A note on the net force and moment on a drop due to surface forces** T.I. Hesla, A.Y. Huang, D.D. Joseph *Keywords:* *Abstract:* It is shown that the net force and moment on a smooth drop or bubble due to surface forces are zero. The net force and moment due to the jump in traction are also zero. *Directory:* **93_6**	Record Place: 203

	Note: Todd I Hesla, Adam Y Huang at AEM	
1993 Submitted: ***Eur. J. Mech. B/Fluids*** Editor: Vol: **12** Issue:**1** Pages: **97-106**	**Drag and moment in viscous potential flow** D.D. Joseph, T.Y. Liao, H.H. Hu *Keywords:* *Abstract:* We consider solutions of the Navier-Stokes equations in which the velocity is given by the gradient of a potential. We show that the drag on bodies and bubbles is the same in viscous and inviscid potential flow. The lift on two-dimensional bodies is given *Directory:* **pre95/papers/1993/DragMoment_5-28-92.--** *Note:* HH Hu now at Dept Mech. Engng & Applied Mech., Univ. Pennsylvania, Philadelphia, PA 19104	Record Place: 202
1992 Submitted: 1991 ***Fundamentals of Two-Fluid Dynamics: Vol. 1 and 2*** Editor: DD Joseph and YY Renardy, eds. Vol: Issue: Pages:	**Chapter 10, Interfacial tension between miscible liquids** D.D. Joseph, H.H. Hu *Keywords:* *Abstract:* We study some basic problems of fluid dynamics of two incompressible miscible liquids modeled as a simple mixture in which the volume of the mixture does not change on mixing. In general, the expansion delta=divu in these problems does not vanish. *Directory:* **pre95/papers/1992/InterfacialTension-mixture** *Note:* Springer Interdisciplinary Applied Mathematics Volumes 3 and 4	Record Place: 201
1992 Submitted: 1992 ***Int. Video J. Engineering Research*** Editor: Vol: **2** Issue: Pages: **17-24**	**Experiments and direct simulations of fluid particle motions** H.H. Hu, D.D. Joseph, A.F. Fortes *Keywords:* *Abstract:* This paper and the accompanying video segment show how the motions of sedimenting particles may be simulated by direct computations based on the Navier-Stokes equations and the equations of particle motion. Sedimenting and fluidized particles are confined *Directory:* **pre95/papers/1992/ParticleMotions/VideoJ.*** *Note:*	Record Place: 200
1992 Submitted: 1992 ***Zfangew Math Phys (ZAMP)*** Editor: Vol: **43** Issue: Pages: **626-644**	**Miscible displacement in a Hele-Shaw cell** H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* We formulated a theory of simple mixtures of incompressible miscible liquids in terms of the mass averaged velocity u and the solenoidal volume averaged velocity W. We derived simplified equations for miscible displacement in a Hele- Shaw cell. *Directory:* **pre95/paper/1992/MiscibleH-S/stability-ZAMP*** *Note:* (c) Birkhauser, Verlag, Basel	Record Place: 199
1992 Submitted: 1991 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **42** Issue: Pages: **385-389**	**Bernoulli equation and the competition of elastic and inertial pressures in the potential flow of a second-order fluid** D.D. Joseph *Keywords: Bernoulli equation, normal extensional stresses, second order fluid* *Abstract:* A Bernoulli equation for potential flow of a second order fluid is derived. This equation is used to form an expression for normal extensional stresses at points of stagnation, in which elastic and inertial pressures compete. *Directory:* **92_19**	Record Place: 198
1992 Submitted: 1991 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **44** Issue: Pages: **127-148**	**Understanding cusped interfaces** D.D. Joseph *Keywords: analytic cusp, disjoining pressure, Stokes flow singularity, surface tension* *Abstract:* The good progress made on the recently opened problem of two-dimensional cusped interfaces in Newtonian and non-Newtonian fluids is reviewed. Some new results are presented and open problems are discussed. *Directory:* **92_15** *Note:*	Record Place: 197
1992 Submitted: 1991 ***J. Rheology*** Editor: Vol: **36** Issue:**4** Pages: **621-662**	**A spinning drop tensioextensometer** D.D. Joseph, M.S. Arney, G. Gillberg, H.H. Hu, D. Hultman, C. Verdier, T.M. Vinagre *Keywords:* *Abstract:* We examine some theoretical and experimental aspects of the measurement of interfacial tension, stress relaxation in elongational flow, and yield stresses in organic liquids, blends of polymer melts, and liquid crystal polymers. ..is based on instrument.. *Directory:* **92_14, [draft- pre95/papers/1992/tensio-extensio.*]** *Note:* G Gillberg at Hoechst Celanese Corp, Summit, NJ. C Verdier at Institut de Mecanique, Grenoble, France. (c) American Institute of Physics	Record Place: 196

1992 Submitted: 1991 ***J. Theoret. Comput. Fluid Dynamics*** Editor: Vol: **3** Issue: Pages: **285-306**	**Direct simulation of fluid particle motions** H.H. Hu, D.D. Joseph, M.J. Crochet *Keywords:* *Abstract:* Continuum models of two-phase flows of solids and liquids use constitutive assumptions to close the equations. A more fundamental approach is a "molecular dynamic" simulation of flowing "big" particles based on reliable macroscopic equations for both... *Directory:* **92_12** *Note:* MJ Crochet at Unite de Mecanique Appliquee, Universite Catholique de Louvain, 1348 Louvain-la-Neuve, Belgium	Record Place: 195
1992 Submitted: 1991 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **42** Issue: Pages: **189-211**	**Elastic short wave instability in extrusion flows of viscoelastic liquids** K.P. Chen, D.D. Joseph *Keywords:* *elastic instability, short waves, wall slip* *Abstract:* An analysis of the stability to short waves of the flow of concentric coextruded polymeric liquids modeled by upper convected Maxwell models is presented. The flow can be unstable to short waves under various conditions on the elastic parameter. *Directory:* **pre95/papers/1992/KC_elastic-shrt-wav*** *Note:* Kang Ping Chen now at Dept Mechanical and Aerospace Engineering, Arizona State Univ., Tempe, AZ 85287	Record Place: 194
1992 Submitted: 1991 ***J. Fluid Mech.*** Editor: Vol: **242** Issue: Pages: **235-247**	**Instability of the equilibrium of a liquid below its vapour between horizontal heated plates** A. Huang, D.D. Joseph *Keywords:* *Abstract:* We study the stability of a motionless liquid below its vapour between heated horizontal plates. The temperature of the bottom plate is held below the vaporization temperature and the top plate is hotter than the vaporization temperature. A water film... *Directory:* **pre95/papers/1992/Phase_change_1.*** *Note:* Adam Huang at AEM	Record Place: 193
1992 Submitted: 1990 ***J. Fluid Mech.*** Editor: Vol: **240** Issue: Pages: **97-132**	**Lubricated pipelining: stability of core-annular flow. Part 5, Experiments and comparison with theory** R. Bai, K. Chen, D.D. Joseph *Keywords:* *Abstract:* Results are given for experiments on water-lubricated pipelining of 6.01 P cylinder oil in a vertical apparatus in up- and down flow in regimes of modest flow rates, less than 3 ft/s. Measured values of the flow rates, holdup ratios, pressure gradients... *Directory:* **pre95/papers/1991/lubPipe/lub-pipeV.*** *Note:* Runyuan Bai, Kangping Chen at AEM	Record Place: 192
1992 Submitted: ***Proc. 1992 US Army Chemical Research Development & Engineering Center*** Editor: Scientific Conference on Chemical Defense Research, November 18, 1992 Vol: Issue: Pages:	**A discussion on the aerodynamic dissemination of simulant released at high altitude** D.D. Joseph, A. Huang, M. Arney *Keywords:* *Abstract:* *Directory:* **92_20** *Note:* !- MISSING OUTPRINT, not sure of authors order	Record Place: 191
1992 Submitted: ***Theoretical and Applied Rheology, Proc. XI-th Int Congress on Rheology, Brussels, Belgium, August 17-21, 1992*** Editor: P. Moldenaers, R. Keunings, eds. Vol: Issue: Pages: **60-64**	**Competition between inertial pressures and normal stresses in the flow induced anisotropy of solid particles** D.D. Joseph, J. Nelson, H.H. Hu, Y.J. Liu *Keywords:* *Abstract:* It is well known that a long body settling in a viscous liquid will turn its broadside to the stream. The same long body settling in a viscoelastic liquid will turn its broadside parallel to the stream at small speeds, but heavier long bodies which fall faster again turn broadside. Sedimenting spheres in a fluid filled channel will arrange themselves so that the line of centers between neighboring spheres is across the stream in a viscous liquid and parallel to the stream ... *Directory:* **92_17** *Note:* (c) Elsevier Science Publishers, BV	Record Place: 190

1992 Submitted: ***Proceedings of the Plenary Lecture at the 1st International Symposium of the Grenoble Mechanics Federation, May 19-21*** Editor: Vol: Issue: Pages:	**The tilt angle transition and potential flow** D.D. Joseph *Keywords:* *Abstract:* The natural orientation of a long body is the key to understanding flow-induced structures of spherical bodies. The natural orientation of a long body falling in a viscous liquid is broadside-on; the body will always turn its long side perpendicular ... *Directory:* **92_16** *Note:* Lecture presented at the NSF-DOE Workshop on Flow of Partriculates and Fluids, NIST, Gaithersburg, MD, September 17, 1992	Record Place: 189
1992 Submitted: ***Eur. J. Mech. B/Fluids*** Editor: Vol: **11** Issue:**3** Pages: **253-264**	**Kelvin-Helmholtz mechanism for side branching in the displacement of light with heavy fluid under gravity** D.D. Joseph, T.Y.J. Liao J.C. *Keywords:* *Abstract:* The problem of stability of smooth fingering motions which may develop from the Rayleigh-Taylor instability when the initial data is analytic is considered. A second-order ordinary linear differential equation with time-dependent coefficients is derived.. *Directory:* **pre95/papers/1992/K-Hmech/KHmech-side-branch.*** *Note:* TYJ Liao at AEM, JC Saut still at U of Paris, France	Record Place: 188
1992 Submitted: ***Physics of Fluids A*** Editor: Vol: **4** Issue:**3** Pages: **567-580**	**Chapter IX. Vortex rings of one fluid in another in free fall** N. Baumann, D.D. Joseph, P. Mohr, Y. Renardy *Keywords:* *Abstract:* In this chapter, we present and interpret experiments in which vortex rings of one immiscible liquid are created in another from drops falling from rest under gravity. These rings are associated with circulations generated by viscosity and, unlike... *Directory:* **92_5** *Note:*	Record Place: 187
1992 Submitted: ***J. Colloid Interface Sci.*** Editor: Vol: **148** Issue:**1** Pages: **291-294**	**Upper and lower bounds for interfacial tension using spinning drop devices** D.D. Joseph, M. Arney, G. Ma *Keywords:* *Abstract:* In this note we show how to use spinning drop devices to determine lower and upper bounds for interfacial tension between immiscible liquids. We like the idea of upper and lower bounds because the equilibrium tension is not a robust function and depends.. *Directory:* **pre95/papers/1992/upper-lower-bounds.*** *Note:* (c) Academic Press, Inc	Record Place: 186
1992 Submitted: ***Particulate Two-Phase Flow*** Editor: M.C. Roco, ed., NSF and Univ. of Kentucky Vol: Issue: Pages: **300-324**	**Chapter 10, Finite Size Effects in Fluidized Suspension Experiments** D.D. Joseph *Keywords:* *Abstract:* 'Two fluid' equations for fluidized suspensions of solid particles can be rigorously formulated as ensemble averages (Joseph & Lundgren 1990). Even though these equations have a rigorous foundation they are not useful unless the interaction forces ... *Directory:* **92_2** *Note:* (c) Butterworth-Heinemann	Record Place: 185
1992 Submitted: ***AHPCRC Report, preprint*** Editor: Also in Chapter 10: Fundamentals of Two-Fluid Dynamics, Springer 1992 Vol: **91-03** Issue: Pages:	**Non-solenoidal velocity effects and Kortweg stresses in simple mixtures of incompressible liquids** H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* We study some basic problems of fluid dynamics of two incompressible miscible liquids modeled as a simple mixture in which the volume of the mixture does not change on mixing. In general, the expansion .=div u in these problems does not vanish. *Directory:* **pre95/papers/1992/HH_non-sol_vel.*, 9th-symp-EES.cam.*** *Note:* !-MISSING OFFPRINT. Same title given for CV210 (Proceedings.. Universidad Cmplutense, Cursos de Verano, Almeria, Spain, July 5-10, 1993), and CV235 (Physica D, 97, 1996)you	Record Place: 184
1991 Submitted: 1991 ***International Video Journal of Engineering Research***	**Application of binary sequences to problems of chaos** P. Singh, P. Mohr, D.D. Joseph *Keywords:* *Abstract:* Oil and water in equal proportion are set into motion between horizontal concentric cylinders when the inner one rotates. In a range of speeds where the water is	Record Place: 183

Editor: Vol: **1** Issue: Pages: **107-114**	Taylor unstable and the oil Taylor stable, we get Taylor cells. The main focus of this paper *Directory:* **pre95/papers/1991/BinarySeq-Chaos/Video-strange-att.1*** *Note:* Singh, Mohr and DDJ at AEM. (c) John Wiley & Sons, Ltd.	
November **1991** Submitted: 1990 ***Phys. Fluids A*** Editor: Vol: **3** Issue:**11** Pages: **2672-2679**	**Long wave and lubrication theories for core-annular flow** K.P. Chen, D.D. Joseph *Keywords:* *Abstract:* Different nonlinear amplitude equations for long waves in core-annular flow are compared. Each equation has its own limits of validity that can be critically assessed by comparing the linearization of approximate and exact theories. *Directory:* **pre95/papers/1991/longWave/KC_long-waveLub-thry*** *Note:* (c) American Institute of Physics	Record Place: 182
1991 Submitted: 1990 ***J. Fluid Mech.*** Editor: Vol: **227** Issue: Pages: **587-615**	**Lubricated pipelining: stability of core-annular flow. Part 4, Ginzburg-Landau equations** K. Chen, D.D. Joseph *Keywords:* *Abstract:* Nonlinear stability of core-annular flow near points of the neutral curves at which perfect core-annular flow loses stability is studied using the Ginzburg-Landau equations. Most of the core-annular flows are always unstable. Therefore the set of core-ann *Directory:* **pre95/papers/1991/lubPipe/lubPipe-IV-GL-eqs.*** *Note:* Kangping Chen now with Dept Mech. and Aeronautical Engineering, Clarkson Univ., Potsdam, NY 13676	Record Place: 181
1991 Submitted: 1990 ***J. Fluid Mech.*** Editor: Vol: **223** Issue: Pages: **383-409**	**Two-dimensional cusped interfaces** D.D. Joseph, J. Nelson, M. Renardy, Y. Renardy *Keywords:* *Abstract:* Two-dimensional cusped interfaces are line singularities of curvature. We create such cusps by rotating a cylinder half-immersed in liquid. A liquid film is dragged out of the reservoir on one side and is plunged in at the other, where it forms a cusp... *Directory:* **pre95/papers/1991/2dimCusped/JN-M-YR-cusps.*** *Note:* John Nelson with AEM; Michael and Yuriko Renardy with Dept Math and ICAM, Virginia Polytechnic Inst. and State Univ., Blacksburg, VA 24061	Record Place: 180
1991 Submitted: 1990 ***Phys. Fluids A*** Editor: Vol: **3** Issue:**5** Pages: **995-996**	**Combined effects of riblets and polymers on drag reduction in pipes** C. Christodoulou, K.N. Liu, D.D. Joseph *Keywords:* *Abstract:* In the present Brief Communication, experiments are reported establishing superposition of drag reduction due to riblets on drag reduction due to polymers, in fully developed turbulent flow of dilute aqueous solutions of polymers (2-50ppm) through 25.4mm *Directory:* **pre95/papers/riblets-polymers.*** *Note:*	Record Place: 179
1991 Submitted: ***FED, Liquid Solid Flows*** Editor: M.C. Roco, T. Magasume, eds. Vol: **118** Issue: Pages: **77-86**	**Finite size effects in fluidized beds** P. Singh, D.D. Joseph *Keywords:* *Abstract:* We consider a one-dimensional theory of fluidized beds in which the fluids and solids equations are decoupled and the system is closed with a momentum equation for the particles alone. The simplest theory, based on the Foscolo-Gibilaro force law, .. *Directory:* **91_6** *Note:* (c) American Society of Mechanical Engineers	Record Place: 178
1991 Submitted: ***Proceedings of Joint DOE/NSF workshop on flow of particulates and fluids, Worcester MA, October 22-24*** Editor: Vol: Issue: Pages: **1-12**	**Wake Architecture in two-dimensional fluidization of spheres. Part 1, Experiments and phenomenogical description** A.F. Fortes, D.D. Joseph *Keywords:* *Abstract:* The structure of a shear flow past freely suspended spheres at low Reynolds numbers (based on the diameter of the spheres and mean fluid velocity) is visualized employing sheets of hydrogen bubbles illuminated by laser light as well as tungsten halogen... *Directory:* **pre95/papers/1991/WakeArchitectures/AF_wake.cam.*** *Note:* Antonio F Fortes with Dept Mech. Engineering, Univ. Brasilia, 70910 Brasilia, DF Brasil	Record Place: 177
1991 Submitted:	**Mathematical problems for miscible, incompressible fluids with Korteweg stresses**	Record Place: 176

Eur. J. Mech. B/Fluids Editor: Vol: **10** Issue:**3** Pages: **253-267**	P. Galdi, D.D. Joseph, L. Preziosi, S. Rionero *Keywords:* *Abstract:* It is shown that the equations governing the motion and diffusion of miscible liquids can be reduced to a form like the Navier-Stokes equations when the equation of state is for the density of a simple mixture. In particular, in this case, W=Cu+D psi ... *Directory:* **pre95/papers/Miscible-K-stresses/mathMiscLiq-K-strs.*, [91_2]** *Note:*	
1990 Submitted: ***Problems Involving a Change ofType*** Editor: D. Kirchgassner, ed. Vol: **99-111** Issue: Pages: **22-50**	**Problems associated with the elasticity of liquids** D.D. Joseph *Keywords:* *Abstract:* These lectures are in three parts: 1. Physical phenomena associated with hyperbolicity and change of type; 2. Conceptual ideas associated with effective viscosities and rigidities and the origins.. 3. Mathematical problems associated with hyperbolicity... *Directory:* **pre95/papers/Elasticity/probsElastctyLiquids** *Note:*	Record Place: 175
1990 Submitted: 1990 ***Physics of Fluids A*** Editor: Vol: **2** Issue:**11** Pages: **1945-1954**	**Stability of core-annular flow with a small viscosity ratio** H.H. Hu, T.S. Lundgren, D.D. Joseph *Keywords:* *Abstract:* It is known that the stability problem for core-annular flow of very viscous crude oil and water is singular, the water annulus appears to be inviscid with boundary layers at the pipe wall and at the interface. *Directory:* **90_11** *Note:* (c) American Institute of Physics	Record Place: 174
1990 Submitted: 1990 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **37** Issue: Pages: **347-377**	**Numerical simulation of viscoelastic flow past a cylinder** H.H. Hu, D.D. Joseph *Keywords: change of type, dilute polymer solution, relaxation, viscoelastic flow past cylinder, vorticity shock, wave propagation* *Abstract:* The flow of an upper-convected Maxwell fluid past a circular cylinder is simulated numerically using the algorithm SIMPLER, which is based on a finite volume discretization on a staggered grid of the governing equations and an iterative solution to ... *Directory:* **90_10** *Note:*	Record Place: 173
1990 Submitted: 1989 ***Two Phase Flows and Waves, IMA Volumes in Mathematics and Its Applications*** Editor: D.D. Joseph, D. Schaeffer, eds., Springer-Verlag Vol: **26** Issue: Pages: **1-20**	**One-dimensional, particle bed models of fluidized suspensions** P. Singh, D.D. Joseph *Keywords:* *Abstract:* One-dimensional unsteady models of a fluidized suspension based on modeling the forces that the fluid exerts on the particles are considered. Four different theories are discussed. The first, by Foscolo and Gibilaro 1984,1987 gives a criterion for... *Directory:* **90_9** *Note:*	Record Place: 172
1990 Submitted: 1989 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **35** Issue: Pages: **287-307**	**Climbing constant, second-order correction of Trouton's viscosity, wave speed and delayed die swell for M1** H.H. Hu, O. Riccius, K.P. Chen, M. Arney, D.D. Joseph *Keywords: climbing constant, delayed die swell, extensional viscosity, wave speed, test fluid M1* *Abstract:* Measurements of wave speed c in M1 imply a fast time lambda=mu/rho c^2 of relaxation. This and the delayed die-swell measurements suggest that M1 is not very elastic. Extensive and very reliable values of the climbing constants show that M1 has weak... *Directory:* **90_6 [pre95/papers/lab/lab-M1-fluid*]** *Note:* All at AEM: Howard H Hu, Oliver Riccius, Kang Ping Chen, Mike Arney, Daniel D Joseph	Record Place: 171
1990 Submitted: 1989 ***J. Fluid Mech.*** Editor: Vol: **214** Issue: Pages: **251-286**	**Lubricated pipelining; Part 3, Stability of core-annular flow in vertical pipes** K. Chen, R. Bai, D.D. Joseph *Keywords:* *Abstract:* The stability of core-annular flow in vertical pipes is analyzed using the linearized theory of stability. In previous studies instabilities due to interfacial friction, interfacial tension and Reynolds stresses in the bulk fluid were identified and... *Directory:* **90_4**	Record Place: 170

	Note:	
1990 Submitted: 1989 ***Int. J. Multiphase Flow*** Editor: Vol: **16** Issue:**1** Pages: **35-42**	**Ensemble averaged and mixture theory equations for incompressible fluid-particle suspensions** D.D. Joseph, T.S. Lundgren, R. Jackson, D.A. Saville *Keywords: Ensemble average, mixture theory, fluid-particle suspensions, fluidized beds* *Abstract:* Two-fluid equations for flowing composites of solid particles in a liquid have been given by mixture theory and by ensemble averaging. The mixture theory equations are postulated and the ensemble averaged equations are derived. *Directory:* **pre95/papers/EnsembleAveraged/equations-TSL** *Note:* (c) Pergamon Press/Elsevier, Great Britain	Record Place: 169
1990 Submitted: 1989 ***Chemical Engineering Science*** Editor: Vol: **45** Issue:**2** Pages: **411-414**	**Generalization of the Foscolo-Gibilaro analysis of dynamic waves** D.D. Joseph *Keywords:* *Abstract:* A new expression for the particle phase pressure in a fluidized bed, generalizing the one used by Foscolo and Gibilaro, is derived. In the new theory uniform fluidization is always unstable. *Directory:* **pre95/papers/FoscoloGibilaro/Foscolo-Gibilaro** *Note:* (c) Pergamon Press plc, Great Britain	Record Place: 168
1990 Submitted: 1989 ***Proceedings of NATO Advanced Research Workshop on Nonlinear Evolution of Spatio-Temporal Structures in Dissipative Continuous Systems, 1989 in Streitberg, FR Germany*** Editor: F.H. Busse, L. Kramer Vol: **225** Issue: **Series B: Physics** Pages: **169-189**	**Couette flows, rollers, emulsions, tall Taylor cells, phase separation and inversion, and a chaotic bubble in Taylor-Couette flow of two immiscible liquids** D.D. Joseph, P. Singh, K. Chen *Keywords:* *Abstract:* Oil and water in equal proportion are set into motion between horizontal concentric cylinders when the inner one rotates. Many different flows are realized and described. In one regime many large bubbles of oil are formed. In a range of speeds where... *Directory:* **pre95/papers/1989/CouetteFlow/CouetteFlow.-- [89_4]** *Note:* Plenum Press, NY, Plenum Publishing Corp. NY	Record Place: 167
1990 Submitted: 1989 ***Applied Numerical Mathematics*** Editor: Vol: **6** Issue: Pages: **425-430**	**Application of the singular value decomposition to the numerical computation of the coefficients of amplitude equations and normal forms** K.P. Chen, D.D. Joseph *Keywords:* *Abstract:* The Fredholm alternative is a standard procedure by which one generates the coefficients of amplitude equations and normal forms. The alternative requires that the inhomogeneous terms in the underlying systems of differential equations, which contain... *Directory:* **89_11** *Note:* Kang Ping Chen still at AEM. Pub Elsevier Science Publishers BV, North- Holland	Record Place: 166
1990 Submitted: Editor: Springer Applied Math Series Vol: **84** Issue: Pages: **755 pages**	**Fluid Dynamics of Viscoelastic Liquids** D.D. Joseph *Keywords:* *Abstract:* This book is about two special topics in rheological fluid mechanics: the elasticity of liquids and asymptotic theories of constitutive models. The major emphasis of the book is on the mathematical and physical consequences of the elasticity of liquids; seventeen of twenty chapters are devoted to this. Constitutive models which are instantaneously elastic can lead to some hyperbolicity in the dynamics of flow, waves of vorticity into rest (known as shear waves), to shock waves of vorticity or velocity, to steady flows of transonic type or to short wave instabilities which lead to ill-posed problems. Other kinds of models, with small Newtonian viscosities, give rise to perturbed instantaneous elasticity, associated with smoothing of discontinuities as in gas dynamics. *Directory:* **faculty/joseph/pre95/book1990/Fld-Dyn-Visco-Liq/** *Note:* (c) Springer-Verlag	Record Place: 165
1990 Submitted: ***Nature*** Editor:	**Separation in flowing fluids** D.D. Joseph *Keywords:* *Abstract:* Two liquids of different viscosities will stratify with the heavy liquid below,	Record Place: 164

Vol: **348** Issue: Pages: **487, 523**	when stationary. But when these stratified liquids are made to flow down a pipe, the less viscous liquid will tend to encapsulate the more viscous liquid, even lubricating... *Directory:* **90_13** *Note*	
1990 Submitted: ***Eur. J. Mech. B/Fluids*** Editor: Vol: **9** Issue:**6** Pages: **565-596**	**Fluid dynamics of two miscible liquids with diffusion and gradient stresses** D.D. Joseph *Keywords:* *Abstract:* The density of incompressible fluids can vary with concentration phi and temperature, but not with pressure. The velocity field u of such incompressible fluids is not in general solenoidal, div u.0. A conservation form for the left hand side of ... *Directory:* **pre95/papers/MiscibleLiquids/miscLiqPaper.*** *Note:* (c) Gauthier-Villars	Record Place: 163
1990 Submitted: ***Reviews of Modern Physics*** Editor: Vol: **62** Issue:**2** Pages: **375-391**	**Addenum to the paper "Heat waves"** D.D. Joseph, L. Preziosi *Keywords:* *Abstract:* Since the appearance of our paper on heat waves [Rev. Mod. Phys. 61, 1989], certain papers which should have been cited have come to our attention. It appears that our effort to write a relatively complete chronology of thought about heat waves fell somew *Directory:* **pre95/papers/heatWaves/LP-heatWavesAdd.*** *Note:* (c) The American Physical Society	Record Place: 162
1990 Submitted: ***Problems Involving a Change of Type*** Editor: D. Kirchgassner, ed. Vol: Issue: Pages: **99-111**	**Mathematical problems associated with the elasticity of liquids** D.D. Joseph *Keywords:* *Abstract:* The mathematical theory of hyperbolicity and change of type is associated with models with an instantaneous elastic response. Basically, this means there is no Newtonian-like part of the constitutive equation. The underlying quasilinear system gives rise *Directory:* **pre95/papers/Elasticity/probsElastctyLiquids*** *Note:* This lecture is in three parts: 1.Physical phenomena associated with hyperbolicity and change of type; 2.Conceptual ideas associated with effective viscosities and rigidities and the origins of viscosity in elasticity; 3. Mathematical problems assoc'd..	Record Place: 161
1990 Submitted: ***AIAA Journal*** Editor: Vol: **28** Issue:**10** Pages: **1697-1698**	**Drag reduction in pipes lined with riblets** K.N. Liu, C. Christodoulou, O. Riccius, D.D. Joseph *Keywords:* *Abstract:* In the present paper, experiments are reported establishing a maximum drag reduction of 5-7% in fully developed turbulent flow of water through 25.4- and 50.8- mm-diam. pipes lined with a film of grooved equilateral triangles of base 0.11 mm. *Directory:* **90_5 [pre95/papers/riblets/ribletPipes*]** *Note:*	Record Place: 160
1990 Submitted: ***Theoret. Comput. Fluid Dynamics*** Editor: Vol: **1** Issue: Pages: **191-227**	**Short-wave instabilities and ill-posed initial-value problems** D.D. Joseph, J.C. Saut *Keywords:* *Abstract:* We characterize ill-posed problems as catastrophically (Hadamard) unstable to short waves. The growth rate tends to infinity as the wavelength tends to zero. The mathematical description of ill-posed problems is framed in terms of instability. *Directory:* **pre95/papers/JCS-ShortWave/short-wave-inst.pdf** *Note:*	Record Place: 159
1989 Submitted: 1989 ***Phys. Fluids A*** Editor: Vol: **1** Issue:**10** Pages: **1677-1685**	**Stability of core-annular flow in a rotating pipe** H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* The linear stability of core-annular flow in rotating pipes is analyzed. Attention is focused on the effects of rotating the pipe and the difference in density of the two fluids. Both axisymmetric and nonaxisymmetric disturbances are considered. *Directory:* **89_10** *Note:* Howard H Hu at AEM. (c) American Institute of Physics	Record Place: 158
1989 Submitted: 1988 ***J. Non-Newtonian Fluid Mech.*** Editor:	**Remarks on inertial radii, persistent normal stresses, secondary motions, and non-elastic extensional viscosities** D.D. Joseph *Keywords:*	Record Place: 157

Vol: **32** Issue: Pages: **107-114**	*Abstract:* In this note I discuss some consequences of the balance of inertia and normal stresses in nearly steady slow motions. I argue that the fluid's elasticity cannot be determined from its extensional viscosity. A formula is given for the extensional viscosity *Directory:* **89_9** *Note:*	
1989 Submitted: 1988 ***Physics Letters A*** Editor: Vol: **135** Issue:**4,5** Pages: **247-253**	**Autoregressive methods for chaos on binary sequences for the Lorenz attractor** P. Singh, D.D. Joseph *Keywords:* *Abstract:* A binary sequence is defined for the Lorenz attractor. This binary sequence contains some information about the original system. To extract this information we have used autoregressive methods from the theory of signal processing. The binary sequences... *Directory:* **89_7** *Note:* (c) Elsevier Science Publishers BV, North-Holland Physics Publishing Div.	Record Place: 156
1989 Submitted: 1988 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **31** Issue: Pages: **325-343**	**Change of type and loss of evolution of the White-Metzner model** C. Verdier, D.D. Joseph *Keywords:* *Abstract:* In this paper a mathematical study of the White-Metzner model is presented. This model gives rise to systems of first order nonlinear (not quasilinear) partial differential equations. The unsteady case is studied first to determine if the Cauchy problem.. *Directory:* **89_5** *Note:*	Record Place: 155
1989 Submitted: 1988 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **31** Issue: Pages: **301-323**	**Similarity solutions that give rise to hyperbolicity and change of type in steady flow of a viscoelastic fluid** C. Verdier, D.D. Joseph *Keywords:* *Abstract:* Similarity solutions have proved to be a very useful tool for the study of flows of viscoelastic fluids since they allow us to check numerical computations against them. We compute here hyperbolic regions of the vorticity for an upper convected Maxwell.. *Directory:* **89_6** *Note:*	Record Place: 154
1989 Submitted: 1988 ***J. Fluid Mech.*** Editor: Vol: **205** Issue: Pages: **553-571**	**Stability of periodic arrays of cylinders across the stream by direct simulation** P. Singh, PH. Caussignac, A.F. Fortes, D.D. Joseph, T. Lundgren *Keywords:* *Abstract:* *Directory:* **89_3** *Note:* P Singh at AEM. PH Caussignac at Dept Math, Swiss Federal Inst. of Technology, CH 1015 Lausanne, Switzerland. A Fortes at Dept Mech. Engineering, Univ. Brasilia, 70910 Brasilia DF, Brasil	Record Place: 153
1989 Submitted: 1988 ***J. Fluid Mech.*** Editor: Vol: **205** Issue: Pages: **359-396**	**Lubricated pipelining: stability of core-annular flow; Part 2.** H.H. Hu, D.D. Joseph *Keywords:* *Abstract:* In this paper, we study the linearized stability of three symmetric arrangements of two liquids in core-annular Poiseuille flow in round pipes. Deferring to one important application, we say oil and water when we mean more viscous and less viscous liquids. *Directory:* **89_2** *Note:* Howard H. Hu at AEM	Record Place: 152
1989 Submitted: 1987 ***J. Fluid Mech.*** Editor: Vol: **201** Issue: Pages: **323-356**	**Lubricated pipelining: stability of core-annular flow** L. Preziosi, K. Chen, D.D. Joseph *Keywords:* *Abstract:* The stability of core-annular flow (CAF) in pipes is analyzed using the linear theory of stability. Attention is confined to the potentially stable case of lubricated pipelining with the less viscous liquid, say water, in the annulus. The effects of surface tension and density is included, but gravity is excluded. We find upper and lower branches of the neutral curve in a Reynolds number (R) vs. wave number (OE) plane. A window of parameters is identified in which CAF is stable to small disturbances. *Directory:* **89_1** *Note:*	Record Place: 151
1989 Submitted:	**Heat waves** D.D. Joseph, L. Preziosi	Record Place: 150

Reviews of Modern Physics Editor: Vol: **61** Issue:**1** Pages: **41-73**	*Keywords:* *Abstract:* The concept of transmission of heat by waves is reviewed and interpreted. The notion of an effective thermal conductivity, an effective heat capacity, and relaxation functions for heat and energy is introduced along lines used recently to describe ... *Directory:* **89_8** *Note:* Luigi still in Italy. (c) The American Physical Society, quarterly, thru American Inst. of Physics	
1988 Submitted: 1987 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **28** Issue: Pages: **47-60**	**Anomalous elongational flows and change of type** D.D. Joseph, K. Chen *Keywords:* *Abstract:* Anomalous effects on elongational flows at high rates of elongation reported by Ferguson et al 1987 are here treated as a change of type. Analysis predicts that the vorticity near the drum is hyperbolic, elliptic away from the drum under the supercritical *Directory:* **88_2**	Record Place: 149
1988 Submitted: 1986 ***J. Colloid and Interface Sci.*** Editor: Vol: **124** Issue:**2** Pages: **552-559**	**Measurement of interfacial tension between immiscible liquids with the spinning rod tensiometer** P. Than, L. Preziosi, D.D. Joseph, M. Arney *Keywords:* *Abstract:* A spinning rod interfacial tensiometer (US patent 4,644,782) is described and compared with spinning drop tensiometers. The rod pierces the drop and can help to stabilize the rotating bubble, reducing spin up time and drift. The effects of contact.. *Directory:* **88_1** *Note:* P Than at Aerospace Corp. Los Angeles, CA 90009. L Preziosi now at Instituto di Mathematica, Dell 'Universita di Napoli, Via Mezzacannone 8, 80134 Napoli, Italy	Record Place: 148
1988 Submitted: 1986 ***J. Fluid Mech.*** Editor: Vol: **187** Issue: Pages: **99-113**	**The run-off condition for coating and rimming flows** L. Preziosi, D.D. Joseph *Keywords:* *Abstract:* A layer of liquid can be supported on the inside or outside of a horizontal rotating cylinder if the viscous forces pulling the liquid around with the cylinder are large enough to overcome the force of gravity. If there are places on the cylinder where... *Directory:* **88_10, 86_5** *Note:* Luigi Preziosi at AEM	Record Place: 147
1987 Submitted: 1986 ***J. Fluid Mech.*** Editor: Vol: **185** Issue: Pages: **323-351**	**Stability of rigid motions and coating films in bicomponent flows of immiscible liquids** D.D. Joseph, L. Preziosi *Keywords:* *Abstract:* We consider the problem of global stability of the rigid rotation of two fluids. The realized interfacial configurations minimize a potential. We derive the most general form of the potential in which the working of the contact line may be expressed as.. *Directory:* **87_10, 87_10.stab-rigid-motions.pdf in pre95/papers/BicomponentFlow/LP_stab-rigid-motions** *Note:*	Record Place: 146
1987 Submitted: 1986 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **24** Issue: Pages: **67-83**	**Hyperbolicity and change of type in the flow of viscoelastic fluids through pipes** J.Y. Yoo, D.D. Joseph *Keywords:* *Abstract:* We consider steady flow of an upper convected Maxwell fluid through a channel with wavy walls. The vorticity of this flow will change type when the velocity in the center of the channel is larger than a critical value defined by the propagation of shear.. *Directory:* **87_9** *Note:*	Record Place: 145
1987 Submitted: 1986 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **24** Issue: Pages: **31-65**	**Delayed die swell** D.D. Joseph, J.E. Matta, K. Chen *Keywords:* *Abstract:* The experiments reported here establish that there is a general critical condition associated with die swell which we called delayed die swell. This condition is defined by a critical speed which is the area-averaged velocity, the extrusion velocity... *Directory:* **87_8** *Note:* Joseph E Matta at Chemical Research, Development & Engineering Center, Aberdeen Proving Ground, Aberdeen, MD 21010. Kangping Chen at AEM.	Record Place: 144
1987	**Stokes' first problem for viscoelastic fluids**	Record Place:

Submitted: 1986 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **25** Issue: Pages: **239-259**	L. Preziosi, D.D. Joseph *Keywords:* *Abstract:* The theory given in this paper is based on a generalization of Boltzmann's equation of linear viscoelasticity in which the presence of a Newtonian viscosity is acknowledged. The solution of Stokes' first problem for this kind of fluid, with a viscosity *Directory:* **87_7** *Note:* Luigi Preziosi	143
1987 Submitted: 1986 ***J. Fluid Mech.*** Editor: Vol: **177** Issue: Pages: **467-483**	**Nonlinear mechanics of fluidization of beds of spherical particles** A.F. Fortes D.D., Joseph T.S.Lundgren *Keywords:* *Abstract:* Experiments on fluidization with water of spherical particles falling against gravity in columns of rectangular cross-section are described. All of them are dominated by inertial effects associated with wakes. Two local mechanisms are involved: drafting & *Directory:* **87_4** *Note:*	Record Place: 142
1987 Submitted: 1985 ***IMA, Proceedings of Amorphous Polymers Workshop, March 5-8, 1985 at Inst. for Mathematics and its Applications*** Editor: Dafermos, J.L. Ericksen, D. Kinderlehrer, eds. Springer Verlag Vol: **6** Issue: Pages: **57-88**	**Hyperbolic dynamics in the flow of elastic liquids** D.D. Joseph *Keywords:* *Abstract:* In this paper I discuss concepts of viscosity, elasticity, hyperbolicity, Hadamard instability and change of type in the flow of viscoelastic fluids. *Directory:* **87_3** *Note:*	Record Place: 141
1987 Submitted: ***Rheo. Acta*** Editor: Vol: **26** Issue: Pages: **96-99**	**Shear-wave speeds and elastic moduli for different liquids; Part 3, Experiments update** O. Riccius, D.D. Joseph, M. Arney *Keywords: shear-wave speed, effective shear modulus, relaxation time, wave-speed meter* *Abstract:* Tables of values of shear-wave speeds, shear moduli and relaxation times for 18 new liquids are presented, supplementing the tables for 51 liquids given in Part 2. A brief discussion of errors and analysis of the oscilloscope traces is presented. *Directory:* **87_6** *Note:*	Record Place: 140
1987 Submitted: ***SIAM Advances in Multiphase Flow and Related Problems*** Editor: G. Papanicolau, ed. Vol: Issue: Pages: **101-122**	**Nonlinear mechanics of fluidization of spheres, cylinders and disks in water** D.D. Joseph, A.F. Fortes, T.S. Lundgren, P. Singh *Keywords:* *Abstract:* Experiments on fluidization with water of spherical particles falling against gravity in columns of rectangular cross section are described. All of them are dominated by inertial effects associated with wakes. Two local mechanisms are involved: drafting & *Directory:* **87_5** *Note:*	Record Place: 139
1987 Submitted: ***Int. J. Engng. Sci.*** Editor: Vol: **25** Issue:**2** Pages: **189-204**	**Instability of Poiseuille flow of two immiscible liquids with different vicosities in a channel** P.T. Than, F. Rosso, D.D. Joseph *Keywords:* *Abstract:* We study the stability of plane Poiseuille flow of two immiscible liquids of different viscosities and equal densities. The problem is like one considered by C.S. Yih who found that flow in two layers of equal thickness was always unstable. *Directory:* **87_2** *Note:* Pergamon Journals Ltd., Pubd in Great Britain	Record Place: 138
1987 Submitted: ***J. Theoretical Applied Mech.*** Editor: Vol: **6** Issue:**5** Pages: **619-645**	**Nonlinear stability of rotating flow of two fluids** C. Guillope, D.D. Joseph, K. Nguyen, F. Rosso *Keywords:* *Abstract:* The stability of Couette flow between concentric cylinders of two immiscible fluids with different viscosities and different densities is studied. Two approaches are proposed, both based on the energy method. The first one consists in decomposing the solution at time t into a steady solution defined on the evolution configuration plus a	Record Place: 137

	disturbance... The second approach is possible only when an explicit solution is known. *Directory:* *Note:* C Guillope' at Mathematique, Laboratoire d'Analyse Nume'rique, Bat. n 425, Univ. Paris-Sud et CNRS, 91405 Orsay Cedex, France. F Rosso at Dept Math and its Applications, Univ. Naples, Via Mezzocannone 8, 80134, Naples, Italy	
1986 Submitted: 1985 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **20** Issue: Pages: **117-141**	**Change of type and loss of evolution in the flow of viscoelastic fluids** D.D. Joseph, J.C. Saut *Keywords:* *Abstract:* In this paper we discuss concepts associated with viscosity, elasticity, hyperbolicity, Hadamard instability and ill posedness of Cauchy problems in the flow of viscoelastic fluids. We frame the analysis in terms of vorticity and develop relations between change of type in steady flow and the ill posedness of the unsteady problem. We also consider the problem of regularizing Hadamard instabilities by the addition of Newtonian contributions to the constitutive equations. *Directory:* **86_7** *Note:*	Record Place: 136
1986 Submitted: 1985 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **19** Issue: Pages: **237-249**	**Historical perspectives on the elasticity of liquids** D.D. Joseph *Keywords:* *Abstract:* The existence of normal stresses, shear thinning and recoil in polymeric solutions and undiluted polymers (melts) makes it impossible to believe that every liquid is Newtonian. There are recurrent arguments starting with Poisson 1829, stimulated by Maxwel *Directory:* **86_6** *Note:*	Record Place: 135
1986 Submitted: 1985 ***J. Fluid Mech.*** Editor: Vol: **171** Issue: Pages: **309-338**	**Shear-wave speeds and elastic moduli for different liquids; Part 2, Experiments** D.D. Joseph, O. Riccius, M. Arney *Keywords:* *Abstract:* In this paper we describe the experimental apparatus that we use to measure transit speeds. Tables of measured values of transit speeds and the corresponding values of the shear modulus are presented. The criteria we use to determine if a transit speed is a shear-wave speed are described and applied to the data. The main criteria are that transit speeds should be independent of the gap size and the corresponding value of the shear modulus should be consistent with independent rheometrical measurements. ... *Directory:* **86_2** *Note:*	Record Place: 134
1986 Submitted: 1985 ***J. Fluid Mech.*** Editor: Vol: **171** Issue: Pages: **289-308**	**Shear-wave speeds and elastic moduli for different liquids; Part 1, Theory** D.D. Joseph, A. Narain, O. Riccius *Keywords:* *Abstract:* In this paper we develop a theory for a rheometrical device for measuring the speed of shear waves into a region at rest. The device is a Couette apparatus with a narrow gap. The outer cylinder is moved impulsively and a time of transit is measured. *Directory:* **86_1** *Note:* A Narain now at Dept Mech. Engineering and Engineering Mech., Michigan Technological Univ., Houghton, MI 49931	Record Place: 133
1986 Submitted: 1984 ***SIAM J. Math. Anal.*** Editor: Vol: **17** Issue:**4** Pages: **894-910**	**Hopf bifurcation in two component flow** M. Renardy, D.D. Joseph *Keywords: two-component flow, Hopf bifurcation* *Abstract:* The stability of viscosity-stratified bicomponent flow has been studied by long wave asymptotics, by short wave asymptotics and numerically. These studies have shown that interfacial instabilities arise from the viscosity difference between th two fluids. *Directory:* **86_9** *Note:* (c) Society for Industrial and Applied Mathematics	Record Place: 132
1986 Submitted: ***Phys. Fluids*** Editor: Vol: **29** Issue:**9** Pages: **2771**	**Rollers** D.D. Joseph, K. Nguyen, G.S. Beavers *Keywords:* *Abstract:* High-viscosity liquids hate to work. Low-viscosity liquids are the victims of the laziness of high-viscosity liquids because they are easy to push around. The arrangement of components in two fluid flows is typically nonunique. There is a problem of places *Directory:* **86_8** *Note:* prev. published	Record Place: 131

1986 Submitted: ***Rend. Sem. Mat. Univ. Politec. Torino*** Editor: Vol: **44** Issue:**2** Pages: **173-206**	**Recent results on the stability of rotating flows of two fluids** D.D. *Keywords:* *Abstract:* Flows of two fluids are important and interesting because they are commonplace, they lend themselves to technological application and they introduce new phenomena without counterpart in the flow of one fluid. Many configurations of flow of two fluids are *Directory:* **86_4** *Note:* Full Journal : Universita e Politecnico di Torino, Seminario Matematico. Rendiconti. Univ. Politec. Torino, Turin.	Record Place: 130
1986 Submitted: ***Proceedings of the Conference on Energy, Stability, Theory and Convection, Capri, May 20-28, 1986*** Editor: Vol: Issue: Pages: **364-382**	**Two fluids heated from below** D.D. Joseph *Keywords:* *Abstract:* We consider the problem of stability of the conduction solution of two fluids in two layers heated from below. This is the classical Benard problem, but for two fluids. The two fluid problem is never self-adjoint. We compute the adjoint. The computation ... *Directory:* **86_3** *Note:*	Record Place: 129
1985 Submitted: 1985 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **19** Issue: Pages: **15-41**	**Hyperbolicity and change of type in the flow of viscoelastic fluids through channels** J.Y. Yoo, D.D. Joseph *Keywords:* *Abstract:* We consider steady flow of an upper convected Maxwell fluid through a channel with wavy walls. The vorticity of this flow will change type when the velocity in the center of the channel is larger than a critical value defined by the propagation of shear. … *Directory:* **85_3** *Note:*	Record Place: 128
1985 Submitted: 1984 ***Phys. Fluids*** Editor: Vol: **28** Issue:**3** Pages: **995-997**	**Effects of quadratic drag on convection in a saturated porous medium** D.A. Nield, D.D. Joseph *Keywords:* *Abstract:* The effects of inertia (involving a drag which is quadratic in velocity) on convection in a fluid-saturated porous medium are considered. It is shown that the effect of quadratic drag is physically significant for natural convection, at realistic *Directory:* **85_7** *Note:* DA Nield at Dept Mathematics and Statistics, Univ. of Auckland, Auckland, New Zealand	Record Place: 127
1985 Submitted: 1984 ***Phys. Fluids*** Editor: Vol: **28** Issue:**3** Pages: **788-793**	**Oscillatory instability in a Benard problem of two fluids** Y. Renardy, D.D. Joseph *Keywords:* *Abstract:* A linear stability analysis for a Benard problem with two layers is considered. The equations are not self-adjoint. The system can lose stability to timeperiodic disturbances. For example, it is shown numerically that when the viscosities and coefficient *Directory:* **85_6** *Note:*	Record Place: 126
1985 Submitted: 1984 ***ARMA*** Editor: Vol: **87** Issue:**3** Pages: **213-251**	**Hyperbolicity and change of type in the flow of viscoelastic fluids** D.D. Joseph, M. Renardy, J.-C. Saut *Keywords:* *Abstract:* The equations governing the flow of viscoelastic liquids are classified according to the symbol of their differential operators. Propagation of singularities is discussed and conditions for a change of type are investigated. The vorticity equations for steady flow can change type when a critical condition involving speed and stresses is satisfied. This leads to a partitioning of the field of flow into subcritical and supercritical regions, as in the problem of transonic flow. … *Directory:* **85_2** *Note:* Jean-Claude Saut at Dept Math. Universite' de Paris-Sud, Orsay	Record Place: 125
1985 Submitted: 1984	**Hyperbolicity and change of type in sink flow** J.Y. Yoo, M. Ahrens, D.D. Joseph	Record Place: 124

J. Fluid Mech. Editor: Vol: **153** Issue: Pages: **203-214**	*Keywords:* *Abstract:* We consider the problem of steady fast flow of a family of Oldroyd fluids into a hole, and show that the field of flow is partitioned into elliptic (subcritical) and hyperbolic (supercritical) regions. We analyze the characteristics and show that the vort *Directory:* **85_1** *Note:* Mark Ahrens at AEM. Jung Y. Yoo at Dept Mech. Engineering, Seoul National University, Seoul, Korea	
1985 Submitted: 1983 ***J. Fluid Mech.*** Editor: Vol: **153** Issue: Pages: **151-165**	**Stability of rigid motions and rollers in bicomponent flows of immiscible liquids** D.D. Joseph, Y. Renardy, M. Renardy, K. Nguyen *Keywords:* *Abstract:* We consider the motion of two rings of liquids with different viscosities and densities lying between concentric cylinders that rotate with the same angular velocity [omega]. Gravity is neglected and interfacial tension is included. We show that rigid motions are globally stable and that the shape of the interface which separates the two fluids is determined by a minimizing problem for a potential P defined as the negative of the sum of the kinetic energies of two rigid motions plus the surface energy of the interface. ... *Directory:* **85_5** *Note:* K. Nguyen now with Firestone Tire and Rubber Co., Akron, Ohio 44317	Record Place: 123
1985 Submitted: 1983 ***J. Fluid Mech.*** Editor: Vol: **150** Issue: Pages: **381-394**	**Couette flow of two fluids between concentric cylinders** Y. Renardy, D.D. Joseph *Keywords:* *Abstract:* We consider the flow of two immiscible fluids lying between concentric cylinders when the outer cylinder is fixed and the inner one rotates. The interface is assumed to be concentric with the cylinders, and gravitational effects are neglected. We present a numerical study of the effect of different viscosities, different densitities and surface tension on the linear stabilitity of the Couette flow. Our results indicate that, with surface tension, a thin layer of the less-viscous fluid next to either cylinder is linearly stable and that it is possible to have stability with the less dense fluid lying outside. The stable configuration ... *Directory:* **85_4** *Note:*	Record Place: 122
1985 Submitted: ***Viscoelasticity and Rheology*** Editor: A. Lodge, J. Nohel, M. Renardy, eds. Academic Press Vol: Issue: Pages: **235-321**	**Hyperbolic phenomena in the flow of viscoelastic fluids** D.D. Joseph, Appendix by Marshall Slemrod *Keywords:* *Abstract:* This paper treats the problem of hyperbolicity, change of type and nonlinear wave propagation in the flow of viscoelastic fluids. Rate equations for fluids with and without instantaneous elasticity are derived and discussed. ... *Directory:* **85_6** *Note:* M Slemrod at Dept Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, NY 12180	Record Place: 121
1984 Submitted: 1983 ***J. Fluid Mech.*** Editor: Vol: **141** Issue: Pages: **319-345**	**Non-uniqueness and stability of the configuration of flow of immiscible fluids with different viscosities** D.D. Joseph, K. Nguyen, G.S. Beavers *Keywords:* *Abstract:* High-viscosity liquids hate to work. Low-viscosity liquids are the victims of the laziness of high-viscosity liquids because they are easy to push around. The arrangement of components in steady flow of immiscible liquids is typically non-unique. The problem of selection of arrangements is defined here and is studied by variational methods under the hypothesis that the realized arrangements are the ones that maximize the speed on exterior boundaries for prescribed boundary tractions, or the ones that minimize the tractions for prescribed speeds. *Directory:* **84_6** *Note:*	Record Place: 120
1984 Submitted: 1983 ***J. Fluid Mech.*** Editor: Vol: **141** Issue: Pages: **309-317**	**Instability of the flow of two immiscible liquids with different viscosities in a pipe** D.D. Joseph, M. Renardy, Y. Renardy *Keywords:* *Abstract:* We study the flow of two immiscible fluids of different viscosities and equal density through a pipe under a pressure gradient. This problem has a continuum of solutions corresponding to arbitrarily prescribed interface shapes. The question therefore... *Directory:* **84_5**	Record Place: 119

	Note: Michael and Yuriko Renardy at Mathematics Research Center, U of Wisconsin-Madison, 610 Walnut St., Madison, WI 53705	
1984 Submitted: 1983 ***J. Fluid Mech.*** Editor: Vol: **145** Issue: Pages: **11-70**	**Interfacial shapes between two superimposed rotating simple fluids** H.A. Tieu, D.D. Joseph, G.S. Beavers *Keywords:* *Abstract:*The interfacial shape of two immiscible simple fluids in a vertical cylinder which oscillates about its axis is investigated using the theory of domain perturbations. The perturbation stresses are expressed by integrals over the history of the deformation. At first order the azimuthal velocity field satisfies the requirements of continuity in velocity and shear stresses across the interface. At second order the solution consists of a mean part and a time-periodic part varying at twice the frequency of the cylinder. the mean problem is inverted for the mean secondary flow, pressure and interfacial shape. Experimental data for two polymeric oils (TLA227 and STP) show qualitative agreement with theoretical predictions for the mean interfacial shapes. *Directory:* **84_4** *Note:* HA Tieu at Goodyear Tire and Rubber Co. Akron, Ohio	Record Place: 118
1984 Submitted: 1982 ***J. of Elasticity*** Editor: Vol: **14** Issue: Pages: **19-26**	**Classification of linear viscoelastic solids based on a failure criterion** A. Narain, D.D. Joseph *Keywords:* *Abstract:* An isotropic, incompressible linear viscoelastic solid subjected to a step shear displacement fails if the relaxation function G(s) is such that 0<G(0)< infty and -infty<G'(0)<=0. In this case, the discontinuity in displacement propagates into ... *Directory:* **84_1** *Note:* Narain at Dept Mech. Engineering and Engineering Mech., Michigan Tech. Univ., Houghton, MI 49931 USA. Martinus Nijhoff Pub. The Hague, Netherlands.	Record Place: 117
1984 Submitted: 1981 ***ARMA*** Editor: Vol: **86** Issue: Pages: **65-84**	**Systematic linearization for stability of shear flows of viscoelastic fluids** J. Dunwoody, D.D. Joseph *Keywords:* *Abstract:* The phenomenon of melt fracture occurring in the process of polymer extrusion (see Tordella, 1963) has attracted the attention of research workers in the past two decades. In order to understand the mechanisms which might give rise to this phenomenon, ... *Directory:* **84_2** *Note:* J. Dunwoody at Dept of Engineering Math., The Queen's Univ. of Belfast, Northern Ireland	Record Place: 116
1984 Submitted: ***Rheol. Acta*** Editor: Vol: **23** Issue: Pages: **345-354**	**Remarks on the stability of viscometric flow** M. Ahrens, D.D. Joseph, M. Renardy, Y. Renardy *Keywords: viscometric flow, instability, short memory assumption, change of type* *Abstract:* *Directory:* **84_7** *Note:*	Record Place: 115
1984 Submitted: ***J. Rheol*** Editor: Vol: **28** Issue:**4** Pages: **325-345**	**Climbing constants for various liquids** D.D. Joseph, G.S. Beavers, A. Cers, C. Dewald, A. Hoger, P.T. Than *Keywords:* *Abstract:* In this article we present tables of values of the climbing constant \hat beta=3alpha_1 + 2alpha_2, where alpha_1 and alpha_2 are the parameters of the second-order approximation to the stress in a slow, slowly varying flow of any simple non-Newtonian... *Directory:* **84_3** *Note:* Carolyn Dewald and others at AEM, U of M. Anne Hoger at Dept Theoretical and Applied Mech., Univ. Illinois, Urbana-Champaign.	Record Place: 114
1983 Submitted: 1983 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **13** Issue: Pages: **203-222**	**Extrudate swell for a round jet with large surface tension** H.A. Tieu, D.D. Joseph *Keywords:* *Abstract:* The problem of extrudate swell of a viscoelastic fluid from a round pipe is studied by the method of domain perturbations. The perturbation problems are solved by a finite-element method through second-order in the flow rate parameter epsilon for small.. *Directory:* **83_7** *Note:* Pub. Elsevier Science Publishers B.V., Amsterdam	Record Place: 113
1983 Submitted: 1982 ***J. Fluid Mech.***	**Jets into liquid under gravity** D.D. Joseph, K. Nguyen, J.E. Matta	Record Place: 112

Editor: Vol: **128** Issue: Pages: **443-468**	*Keywords:* *Abstract:* We study the flow of a heavy, viscous, possibly non-Newtonian axisymmetric jet of liquid of density rho falling under gravity g into a lighter liquid of density ~-rho. If the change in the momentum of the entrained lighter liquid is neglected the jet... *Directory:* **83_2** *Note:* K Nguyen with AEM U of M; Matta with Aberdeen Proving Ground, MD 21018	
1983 Submitted: 1981 ***Chaotic Behavior of Deterministic Systems*** Editor: Vol: Issue: Pages: **1**	**Stability and bifurcation theory (course 5)** D.D. Joseph *Keywords: TOC: Bifurcation in R', in R^2, Projections into R^2, Bifurcation of periodic orbits. Normal forms. Derivation of the autonomous equation, Bifurcation from periodic solutions. Hopf bifurcation into a torus of subharmonic and asymptotically ...* *Abstract:* In this lecture we consider the theory of singular points of plane curves. And to these considerations we add the study of stability. ... *Directory:* **83_3** *Note:* Pubd North-Holland Publishing Co. 1983	Record Place: 111
1983 Submitted: ***Transactions of the 39th Conference of Army Mathematicians*** Editor: Vol: Issue: Pages: **1-6**	**Examples and significance of change of type in viscoelasticity** D.D. Joseph, M. Renardy, J.-C. Saut *Keywords:* *Abstract:* The equations governing the flow of viscoelastic fluids are classified according to the symbol of their differential operators. Conditions for a change of type in steady two-dimensional flows are derived for a three-constant Oldroyd model. ... *Directory:* **83_6** *Note:*	Record Place: 110
1983 Submitted: ***Lecture Notes in Mathematics, Equadiff 82. Proceedings Worzburg 1982*** Editor: Also in Transactions of 28th Conference of Army Mathematicians, ARO Report, 83-1 (1983). Vol: **1017** Issue: Pages: **476-507**	**Linearized dynamics of shearing deformation perturbing rest in viscoelastic materials** A. Narain, D.D. Joseph *Keywords:* *Abstract:* This paper extends our earlier work on the propagation of jumps in velocity and displacement for shearing deformations imposed impulsively at the boundary of viscoelastic fluids and solids obeying constitutive equations in integral form with arbitrary... *Directory:* **83_5** *Note:*	Record Place: 109
1983 Submitted: ***Rheol. Acta*** Editor: Vol: **22** Issue: Pages: **528-538**	**Remarks about the interpretation of impulse experiments in shear flows of viscoelastic liquids** A. Narain, D.D. Joseph *Keywords: step jump, first normal-stress difference, reflecting shock waves, relaxation function* *Abstract:* The effect of inertia in three popular impulse experiments in shear flows of viscoelastic liquids is considered. Dynamics of the flow is used to evaluate the stress observables such as the shear stress and the first normal stress difference at the walls. *Directory:* **83_4** *Note:*	Record Place: 108
1983 Submitted: ***ARMA*** Editor: Vol: **81** Issue:**1** Pages: **53-95**	**Fading memory** J.C. Saut, D.D. Joseph *Keywords:* *Abstract:* Fading memory expresses the intuitive idea that the recent rather than the remote history of deformation of a material body should have a greater effect on the present stress. The problem of fading memory is to give a useful mathematical formulation... *Directory:* **83_1** *Note:*	Record Place: 107
1982 Submitted: 1981 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **10** Issue:	**Matched eigenfunction expansions for slow flow over a slot** S.A. Trogdon, D.D. Joseph *Keywords:* *Abstract:* We solve the problem of plane flow of a second-order fluid over a rectangular slot when inertia is neglected by matching biorthogonal eigenfunction expansions in different regions of flow. The method appears to be cheaper and more accurate than direct	Record Place: 106

Pages: **185-213**	num *Directory:* **82_4** *Note:* Trogdon at Dept of Mechanical Engineering, Clarkson College, Potsdam, New York 13676	
1982 Submitted: 1980 ***SIAM J. Appl. Math.*** Editor: Vol: **47** Issue:**3** Pages: **653-677**	**The shape of stress-free surfaces on a sheared block** P. Dixit, D.D. Joseph *Keywords:* *Abstract:* We obtain solutions for the shape of the free surface on the upper and lower boundaries of an initially rectangular, incompressible linearly viscoelastic block when the block is sheared at the vertical sidewall. To solve the problem when the vertical... *Directory:* **82_2** *Note:*	Record Place: 105
1982 Submitted: ***Proceedings of 9th US National Congress of Applied Mechanics, Held at Cornell Univ., Ithaca, NY June 21-25, 1982*** Editor: Y.H. Pao, et al Vol: Issue: Pages: **433-436**	**The application of bifurcation theory to physical problems** D.D. Joseph *Keywords:* *Abstract:* I am going to start my lecture with a citation by James Lighthill 1982. He says "There is one great complicating feature that introduces major difficulties into mechanics, physics, chemistry, engineering, astronomy and biology. This complicating feature.. *Directory:* **82_7** *Note:*	Record Place: 104
1982 Submitted: ***Rheol. Acta*** Editor: Vol: **21** Issue: Pages: **228-250**	**Linearized dynamics for step jumps of velocity and displacement of shearing flows of a simple fluid** A. Narain, D.D. Joseph *Keywords:* *step jump, singular surface, reflection, shearing flow, simple fluid* *Abstract:* We consider linearized dynamics associated with step jumps in the velocity or displacement of the boundary of a fluid in a shearing motion. The discontinuity will propagate into the interior with a speed C = sqrt[G(0)/rho], (rho is the density) if... *Directory:* **82_6** *Note:* Narain with AEM U of M	Record Place: 103
1982 Submitted: ***Water Resources Research*** Editor: Vol: **18** Issue:**4** Pages: **1049-1052**	**Nonlinear equation governing flow in a saturated porous medium** D.D. Joseph, D.A. Neild, G. Papanicolaou *Keywords:* *Abstract:* It is argued that the appropriate generalization of Darcy's law when inertia effects are included takes the form nabla p = -(mu/k) V -(rho c/k^[1/2])|V|V, div V = 0, where k is the permeability of the medium and the 'form drag constant' c is a coeff... *Directory:* **82_5** *Note:* Pubd by American Geophysical Union	Record Place: 102
1982 Submitted: ***ARMA*** Editor: Vol: **78** Issue:**3** Pages: **223-274**	**Convergence of biorthogonal series of biharmonic eigenfunctions by the method of titchmarsh** D.D. Joseph, L.D. Sturges, W.H. Warner *Keywords:* *Abstract:* Canonical edge problems for the biharmonic equation can be solved by separating variables. The eigenvalues and eigenvectors arising in this separation are derived from a reduced system of ordinary differential equations along lines suggested in...RCSmith *Directory:* **82_3** *Note:*	Record Place: 101
1981 Submitted: 1981 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **9** Issue: Pages: **269-300**	**Rimming flow of a viscoelastic liquid inside a rotating horizontal cylinder** J. Sanders, D.D. Joseph, G.S. Beavers *Keywords:* *Abstract:* The flow of a simple liquid coating the inside of a horizontal, steadily rotating cylinder is investigated. The theory, in combination with the experiments, allows us to determine the complex viscosity eta*(Omega) of the liquid, characterizing its ... *Directory:* **81_5** *Note:*	Record Place: 100
1981 Submitted: 1980 ***Rheol. Acta***	**The stick-slip problem for a round jet; II, Small surface tension** S.A. Trogdon, D.D. Joseph *Keywords:*	Record Place: 99

Editor: Vol: **20** Issue:**1** Pages: **1-13**	*Abstract:* The stick-slip problem for a round jet studied in Part I gives a good approximation for the swell of a low speed jet when the surface tension is large but it fails when the surface tension is small. In this paper a new stick-slip problem II is defined.. *Directory:* **81_2** *Note:*	
1981 Submitted: ***Dynamical Systems and Turbulence, Warwick 1980; Proceedings of a Symposium Held at Univ. of Warwick, 1979/80*** Editor: D.A. Rand, L.-S. Young, eds.; Springer Lecture Notes in Mathematics Vol: **898** Issue: Pages: **1-12**	**Lectures on bifurcation from periodic orbits** D.D. Joseph *Keywords:* *Abstract:* These lectures are about bifurcations from a periodic orbit of an evolution equation with periodic forcing. The analysis applies to equations in an arbitrary Hilbert space, not just to finite dimensional problems. The results described here are joint... *Directory:* **81_10** *Note:* A. Dold, B. Eckmann series eds., Mathematics Inst., Univ. of Warwick, Advisor D.B.A. Epstein	Record Place: 98
1981 Submitted: ***ASME-SMAC Forum*** Editor: J. Fong, ed. Vol: Issue: Pages:	**Mathematics, Mechanics, and engineering: an essay on the contribution of applied mechanics to engineering and applied science** D.D. Joseph *Keywords:* *Abstract:* *Directory:* **81_10** *Note:* !-MISSING OUTPRINTS	Record Place: 97
1981 Submitted: ***ARMA*** Editor: Vol: **77** Issue:**3** Pages: **199-261**	**Free surface problems induced by motions perturbing the natural state of simple solids** P.M. Dixit, A. Narain, D.D. Joseph *Keywords:* *Abstract:* We develop a perturbation theory for solids along the lines which have been used to treat the motions of fluids which perturb states of rest or rigid motion. The perturbation theory for fluids does not assume special rheological models; it defines its own *Directory:* **81_4** *Note:*	Record Place: 96
1981 Submitted: ***ARMA*** Editor: Vol: **75** Issue:**3** Pages: **251-256**	**Instability of the rest state of fluids of arbitrary grade greater than one** D.D. Joseph *Keywords:* *Abstract:* I am going to prove that the rest state of fluids of grade n, any n.1, is unstable in the spectral sense of linearized theory when the ratio of the coefficients of A_n and A_(n-1) in the constitutive equation is negative. Negative ratios, and only ... *Directory:* **81_3** *Note:*	Record Place: 95
1981 Submitted: ***Topics in Applied Physics, Hydrodynamic Instabilities and the Transition to Turbulence*** Editor: H.L. Swinney, J.P. Gollub, eds. , Vol: **45** Issue: Pages: **27-76**	**Hydrodynamic stability and bifurcation** D.D. Joseph *Keywords:* *Abstract:* The goal of hydrodynamics is to describe and predict the motions of fluids under applied forces. For incompressible Navier-Stokes fluids, in many circumstances, these forces scale with the Reynolds number. When the Reynolds number is small... *Directory:* **81_1** *Note:* Pubd Springer-Verlag, Berlin, Heidelberg, Germany	Record Place: 94
1980 Submitted: 1980 ***Phys. Fluids***	**Boundary conditions for thin lubrication layers** D.D. Joseph	Record Place: 93

Editor: Vol: **23** Issue:**12** Pages: **2356-2358**	*Keywords:* *Abstract:* In certain circumstances, the effects of a thin lubrication layer may be accommodated by a slip flow boundary condition with the gradient of the tangential component of the velocity at the wall proportional to the square of the tangential component there. *Directory:* **80_10** *Note:* Pub'd American Institute of Physics 1980	
1980 Submitted: 1980 ***Rheol. Acta*** Editor: Vol: **19** Issue: Pages: **404-420**	**The stick-slip problem for a round jet; I. Large surface tension** S.A. Trogdon, D.D. Joseph *Keywords:* *Abstract:* A jet of fluid is extruded from a round pipe at low speed with gravity and wind shear neglected. The fluid must adjust from a fully developed flow in the pipe to a uniform flow far downstream. At low speeds this adjustment appears to require that ... *Directory:* **80_9** *Note:*	Record Place: 92
1980 Submitted: 1979 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **6** Issue: Pages: **325-331**	**A normal stress amplifier for the second normal stress difference** L.D. Sturges, D.D. Joseph *Keywords:* *Abstract:* When a viscoelastic fluid flows down a tilted trough, the free surface bulges upward in the middle. The amount of bulge is proportional to the second normal stress difference of the fluid. Wineman and Pipkin 1966 were the first to suggest that ... *Directory:* **80_6** *Note:* Sturges at Dept of Engineering Science and Mechanics, and Engineering Research Institute, Iowa State University, Ames, Iowa 50011 USA	Record Place: 91
1980 Submitted: 1979 ***Rheol. Acta*** Editor: Dietrich Steinkopff, Verlag, Darmstadt Vol: **19** Issue: Pages: **19-31**	**The free surface on a liquid between cylinders rotating at different speeds; Part III** G.S. Beavers, J.Y. Yoo, D.D. Joseph *Keywords:* *Abstract:* When a viscoelastic fluid is sheared between two concentric cylinders undergoing differential rotation the free surface on the fluid is deformed as a consequence of the normal stresses induced in the fluid by the shearing motion. .. *Directory:* **80_3** *Note:*	Record Place: 90
1980 Submitted: ***Recent Methods in Nonlinear Analysis and Applications, SAFA IV - Int'l Meeting, Napoli, Italy, March 21-28*** Editor: Liguori, ed. Vol: **4** Issue: Pages:	**Bifurcation of periodic solutions** D.D. Joseph *Keywords:* *Abstract*: I consider the problem du/dt = f(t,mu,u), f(t,.,.)=f(t+T,.,.), f(t,mu,0)=mu[element of] I_0, where I_0 is an interval containing mu=0, u is a vector in R^n, or more generally, in a Hilbert space. The problem (1) can arise when there is a forced T-periodic motion which is subtracted off the governing problem leading to the local form given by (1) in which u=0 is a solution. The analysis given here is taken from Chap. X of the forthcoming book "Elementary Stability and Bifurcation Theory" by G. Iooss and D. Joseph which is to appear in 1980 as a Springer Undergratuate Textbook in Mathematics. *Directory:* **80_11** *Note:* !-MISSING OUTPRINTS	Record Place: 89
1980 Submitted: ***Proceedings of IUTAM Toronto*** Editor: North Holland, 1980 Vol: Issue: Pages: **295-305**	**Bifurcation in fluid mechanics** D.D. Joseph *Keywords:* *Abstract:* A broad discursive review of bifurcation theory in fluid mechanics is given. The review delineates the assumptions, methods and potential for application of bifurcation theory. The problem of sequential bifurcation of flows into other flows... *Directory:* **80_8** *Note:* IUTAM (International Union of Theoretical and Applied Mechanics) 1980	Record Place: 88
1980 Submitted: ***ARMA*** Editor: Vol: **79** Issue: Pages: **389-393**	**An integral invariant for jets of liquid into air** D.D. Joseph *Keywords:* *Abstract:* A liquid is forced to move from left to right (x increasing) down a round pipe of length L by high pressure imposed at the entrance x = -L of the pipe. The flow is assumed to be axisymmetric but the pressure and velocity which is prescribed at ... *Directory:* **80_7**	Record Place: 87
1980 Submitted: ***Proceedings of a***	**The behaviour of solutions lying on an invariant 2-Torus arising from the bifurcation of a periodic solution**	Record Place: 86

Conference on Bifurcation Theory at Bielefeld, Germany, October 1979 Editor: H. Amann, N. Bayley, K. Kirchgasser, eds., Pitman Pub. Vol: Issue: Pages: **92-114**	G. Iooss, D.D. Joseph *Keywords:* *Abstract:* We are going to consider the problem of bifurcation of a periodic solution into an invariant two-dimensional torus, for the following autonomous differential equation in R^k : dV/dt=F(mu,V), where F is as smooth as we wish and mu is a real parameter. *Directory:* **80_5** *Note*	
1980 Submitted: ***Transactions of the 25th Conference of Army Mathematicians*** Editor: Vol: **80** Issue:**1** Pages: **503-584**	**Motions perturbing states of rest of viscoelastic solids** P.M. Dixit, D.D. Joseph *Keywords:* *Abstract:* Our goal is to derive the canonical forms of the stress and equations of motion governing the motions which perturb the rest state (of elastostatic deformation) and the natural (unstressed and undeformed) state of viscoelastic solids. In this theory... *Directory:* *Note:*	Record Place: 85
1980 Submitted: ***J. Rheol.*** Editor: Vol: **24** Issue:**6** Pages: **719-739**	**Free surface on a simple fluid between cylinders undergoing torsional oscillations; IV, Oscillating Rods** B.E.D. Kolpin, G.S. Beavers, D.D. Joseph *Keywords:* *Abstract:* In earlier papers(Parts 1 and 2) we gave the perturbation analysis for the prediction of the free surface on a simple fluid near an oscillating rod and presented the results of a preliminary experiment involving a single rod in one sample of simple fluid. *Directory:* **80_2** *Note:* BED Kolpin, The 3M Co., St Paul, MN. The Society of Rheology, Inc. Pub'd John Wiley & Sons, Inc	Record Place: 84
1980 Submitted: ***J. Applied Mech.*** Editor: Vol: **87** Issue: Pages: **482-484**	**Stokes flow in a driven sector by two different methods** J. Sanders, V. O'Brian, D.D. Joseph *Keywords:* *Abstract:* A biorthogonal series expansion and a numerical finite-difference approximation are applied to the problem of steady Stokes flow in a driven sector of 10 deg total angle, providing mutual support of the theoretical techniques. For this problem the method *Directory:* **80_1** *Note:*	Record Place: 83
1979 Submitted: 1978 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **5** Issue: Pages: **323-352**	**Experiments on free surface phenomena** G.S. Beavers, D.D. Joseph *Keywords:* *Abstract:* This paper reviews an experimental program in which predictions from domain perturbation theory for motions which perturb the rest state are used in conjunction with experimental measurements on free surface deformations associated with Weissenberg effect *Directory:* **79_6** *Note:* Presented at the UITAM Symposium on Non-Newtonian Fluid Mechanics, Louvain-La-Neuve, Belgium, 28 August-1 September, 1978	Record Place: 82
1979 Submitted: 1978 ***J. Non-Newtonian Fluid Mech.*** Editor: Vol: **5** Issue: Pages: **13-31**	**Perturbation of state of rest and rigid motion of simple fluids and solids** D.D. Joseph *Keywords:* *Abstract:* In the lecture I advocate perturbing states of rest and rigid motion with arbitrary motions. This procedure leads to general expressions for the relation between stress and deformation and defines the parameters which must be measured in order to ... *Directory:* **79_4** *Note:* Elsevier Scientific Publishing Co. Amsterdam, Printed in The Netherlands	Record Place: 81
1979 Submitted: 1978 ***J. Fluid Mech.*** Editor: Vol: **92** Issue:**3** Pages: **529-590**	**Higher-order theory of the Weissenberg effect** J. Yoo, D.D. Joseph, G.S. Beavers *Keywords:* *Abstract:* The higher-order theory of the Weissenberg effect is developed as a perturbation of the state of rest. The perturbation is given in powers of the angular frequency Omega of the rod and the solution is carried out to O(Omega^4). The perturbation induces .. *Directory:* **79_3**	Record Place: 80

	Note:	
1979 Submitted: ***Approximation Methods for the Navier-Stokes Equations*** Editor: Springer Lecture Notes in Mathematics, R. Rautmann, ed. Vol: **771** Issue: Pages: **249-271**	**Direct and repeated bifurcation into turbulence** D.D. Joseph *Keywords:* *Abstract:* This lecture is a review of the applications of the theory of bifurcation to the problem of transition to turbulence. Most of the material in this lecture can be found in detail in my recent review, in other reviews in the same volume and in the monograph *Directory:* **79_5** *Note:*	Record Place: 79
1979 Submitted: ***Annals of the New York Academy of Sciences*** Editor: Vol: **316** Issue: Pages: **150-167**	**Factorization theorems and repeated branching of solutions at a simple eigenvalue** D.D. Joseph *Keywords:* *Abstract:* In this paper I prove factorization theorems which show that, under certain typical hypotheses, the stability of steady and time-periodic solutions can change only at a turning point or at a point of bifurcation. *Directory:* **79_2** *Note:*	Record Place: 78
1979 Submitted: ***2nd Symposium on Trends in Applications of Pure Mathematics to Mechanics*** Editor: London; Pitman Publishing Vol: Issue: Pages: **129**	**A new separation of variables theory for problems of Stokes flow and elasticity** D.D. Joseph *Keywords:* *Abstract:* Some classes of fourth-order boundary-value problems arising in the theory of Stokes flow and elasticity are solved by the method of biorthogonal series. The eigenfunctions are formed from separable solutions when the separation constants (eigenvalues).. *Directory:* **79_1** *Note:*	Record Place: 77
1978 Submitted: 1977 ***Contemporary Developments in Continuum Mechanics and Partial Differential Equations*** Editor: G.M. de La Penha, L.A. Medeiros Vol: Issue: Pages: **254-283**	**Constitutive equations and free surfaces** D.D. Joseph *Keywords:* *Abstract:* The general theory of perturbations of rigid body motions of simple fluids with applications to free surface problems is discussed. The general theory is utilized to explain phenomena exhibited in the movie "Novel Weissenberg Effects" by G.S. Beavers & DDJ *Directory:* **78_10** *Note:* North-Holland Publishing Co.	Record Place: 76
March **1978** Submitted: 1976 ***SIAM J. Appl. Math.*** Editor: Vol: **34** Issue:**2** Pages: **286-296**	**Stokes flow in conical trenches** C.H. Liu, D.D. Joseph *Keywords:* *Abstract:* In this paper we develop a separation of variables theory for solving problems of Stokes flow in cone-shaped trenches formed as the intersection of a cone of circular cross-section and a spherical shell centered at the vertex of the cone. The theory leads *Directory:* **78_3** *Note:*	Record Place: 75
1978 Submitted: 1976 ***SIAM J. Appl. Math.*** Editor: Vol: **34** Issue:**1** Pages: **7-26**	**The convergence of biorthogonal series for biharmonic and Stokes flow edge problems: Part II** D.D. Joseph, L. Sturges *Keywords:* *Abstract:* Sufficient conditions are established for the convergence of the biorthogonal series solving edge problems which arise in elasticity and in Stokes flow in cavities. These conditions and those given in Part I, (D.D.Joseph,vol.33,1977,pp337-347) include... *Directory:* **78_2** *Note:*	Record Place: 74
1978 Submitted: 1976	**Stokes flow in a trench between concentric cylinders** J.Y. Yoo, D.D. Joseph	Record Place: 73

SIAM J. Appl. Math. Editor: Vol: **34** Issue:**2** Pages: **247-285**	*Keywords:* *Abstract:* In this paper we develop a separation of variables theory for solving problems of Stokes flow in annular trenches bounded by horizontal parallel planes and concentric vertical cylinders. The theory leads to a new set of Stokes flow eigenfunctions, ... *Directory:* **78_1**	
1978 Submitted: ***Fluid Dynamics Transactions (Arch. Mechaniki Stosovanej), Proceedings of XIII-th Biennial Fluid Dynamics Symposium, Olztyn-Kortowo, Poland Sept 5- 10, 1977*** Editor: Vol: **9** Issue: Pages: **177-228**	**Hydrodynamic stability and bifurcation** D.D. Joseph *Keywords:* *Abstract:* Our understanding of hydrodynamic stability has been greatly enriched by recent developments in the mathematical theory of bifurcation. Bifurcation theory brings the theory of stability closer to physics and leads to simple criteria by which one can judge *Directory:* **78_4** *Note:*	Record Place: 72
1977 Submitted: 1977 ***Rheol. Acta*** Editor: Dr. Dietrich Steinkopff, ed. Vol: **16** Issue: Pages: **169-189**	**Free surface problems in rheological fluid mechanics** D.D. Joseph, G.S. Beavers *Keywords:* *Abstract:* Free surfaces are sensitive to the state of stress in fluids. The striking variations in the shape of free surfaces induced by the motion of viscoelastic fluids chart the competing effects of elasticity, normal stresses and inertia in the fluid. *Directory:* **77_4** *Note:* Paper, presented to Euromech Colloquium, No. 79, Darmstadt 7-10, 1976	**Record Place:** 71
1977 Submitted: 1976 ***J. Fluid Mech.*** Editor: Vol: **80** Issue:**3** Pages: **443-463**	**Stokes flow in wedge-shaped trenches** C.H. Liu, D.D. Joseph *Keywords:* *Abstract:* In this paper we develop a separation of variables theory for solving problems of Stokes flow in wedge-shaped trenches bounded by radial lines and concentric circles centered at the vertex of the wedge. The theory leads to a set of Stokes flow eigenfuncti *Directory:* **77_9** *Note:*	Record Place: 70
1977 Submitted: 1976 ***J. Fluid Mech.*** Editor: Vol: **81** Issue:**2** Pages: **265-272**	**Novel Weissenberg effects** G.S. Beavers, D.D. Joseph *Keywords:* *Abstract:* We have observed two novel manifestations of the Weissenberg effect in viscoelastic liquids which are set into motion by the rotation of a circular rod. In the first experiment we floated a layer of STP on water. The STP climbs up the rod into the air... *Directory:* **77_6** *Note:* !-photos poor	Record Place: 69
1977 Submitted: ***ARMA*** Editor: Vol: **66** Issue:**2** Pages: **135-172**	**Bifurcation and stability of nT-periodic solutions branching from T-periodic solutions at points of resonance** G. Iooss, D.D. Joseph *Keywords:* *Abstract:* We shall study solutions which bifurcate from forced, T-periodic solutions of evolution equations of the Navier-Stokes type. Our principal interest is in subharmonic bifurcating solutions, n T-periodic solutions with n>=1. *Directory:* **77_12** *Note:*	Record Place: 68
1977 Submitted: ***ARMA*** Editor: Vol: **66** Issue:**2** Pages: **99-118**	**Factorization theorems, stability and repeated birucation** D.D. Joseph *Keywords:* *Abstract:* In this paper I prove theorems about the stability of bifurcating solutions without restricting the study to small amplitudes. I do not even always require that the solutions which I call 'bifurcating' form connected branches; they may be isolated ... *Directory:* **77_11** *Note:*	Record Place: 67
1977 Submitted:	**The bifurcation of T-periodic solutions into nT-periodic solutions and**	Record Place: 66

Proceedings of International Workshop on Synergetics at Schloss Elmau, Bavaria, May 2-7, 1977 Editor: H. Haken, ed. Vol: Issue: Pages:	**Tori** D.D. Joseph *Keywords:* *Abstract:* My lecture on bifurcation and stability of solutions which branch from forced T-periodic solutions is based on the recent work of G. Iooss and myself [ARMA 66(2) 1997, 135-172] and on my forthcoming paper on factorization theorems [ARMA 66(2) 1997, 99-118]. In general, forced T-periodic solutions bifurcate into subharmonic solutions with a fixed period tau(tau=nT; n=1,2,3,4) independent of the amplitude or into a torus [1,3,4,5,6] containing solutions whose analytic properties are not yet fully understood. The subharmonic bifurcating solutions with n=1 are the T-periodic equivalent of a symmetry-breaking bifurcation of steady solutinos with other steady solutions. The symmetry breaking ... *Directory:* **77_10** *Note:* Springer-Verlag !-MISSING OFFPRINTS	
1977 Submitted: ***ARMA*** Editor: Vol: **66** Issue:**4** Pages: **311-344**	**Rotating simple fluids** D.D. Joseph *Keywords:* *Abstract:* In this paper I derive iterative procedures for the sequential computation of velocity fields and strain histories of motions of incompressible simple fluids driven by arbitrary, time-dependent prescribed data. The arbitrary data is a small perturbation.. *Directory:* **77_8** *Note:*	Record Place: 65
1977 Submitted: ***SIAM J. Appl. Math.*** Editor: Vol: **33** Issue:**2** Pages: **337**	**The convergence of biorthogonal series for biharmonic and stokes flow edge problems, Part I** D.D. Joseph *Keywords:* *Abstract:* Sufficient conditions are established for the convergence of the biorthogonal series solving edge problems which arise in elasticity and in Stokes flow in cavities. These conditions greatly improve those stated in the excellent work of R.C.T Smith 1952. *Directory:* **77_7** *Note:*	Record Place: 64
1977 Submitted: ***Proceedings of ASME Symposium on Viscoelastic Fluids*** Editor: R.S. Rivlin, Yale Vol: Issue: Pages: **59**	**Free surfaces induced by the motion of viscoelastic fluids** D.D. Joseph, G.S. Beavers *Keywords:* *Abstract:* Free surfaces are sensitive to the state of stress in fluids. The striking variations in the shape of free surfaces induced by the motion of viscoelastic fluids chart the competing effects of elasticity, normal stresses and inertia in the fluid. *Directory:* **77_5** *Note:*	Record Place: 63
1977 Submitted: ***Proceedings of VII-th International Congress on Rheology*** Editor: Vol: Issue: Pages: **242-243**	**Perturbations of the rest state of a simple fluid: the Weissenberg effect induced by torsional oscillation of a rod** D.D. Joseph *Keywords:* *Abstract:* A rod of small diameter (2a) is partially immersed in a vat of simple fluid. The rod is set into torsional oscillation with an angular frequency Omega equal to epsilon sin wt. An analysis of this problem based on a newly developed theory of ... *Directory:* **77_3** *Note:*	Record Place: 62
1977 Submitted: ***ARMA*** Editor: Vol: **64** Issue:**3** Pages: **245-267**	**The free surface on a simple fluid between cylinders undergoing torsional oscillations. Part III, Oscillating planes** L.D. Sturges, D.D. Joseph *Keywords:* *Abstract:* In Part I (Joseph 1976a) of this paper in three parts, a recently developed algorithm (Joseph 1976b) for computing the motions of a simple fluid of integral type which perturb the state of rest was applied to the problem of finding the shape of the free.. *Directory:* **77_2** *Note:* Leroy D Sturges	Record Place: 61
1976 Submitted: ***ARMA*** Editor: Vol: **62** Issue:**4**	**The free surface on a simple fluid between cylinders undergoing torsional oscillations** D.D. Joseph, B.S. Beavers *Keywords:* *Abstract:* In a recent work (Joseph 1976), ideas from the theory of domain perturbations	Record Place: 60

Pages: **323-352**	were used to develop an algorithm for the computation of unsteady motions of a simple fluid. In this algorithm, the rest state is perturbed with an unsteady motion. *Directory:* **76_10** *Note:*	
1976 Submitted: ***Proceedings of Conference, Turbulence and Navier Stokes Equations, University of Paris-Sud, Orsay, June 12-13, 1975*** Editor: Roger Temam, ed. Vol: **565** Issue: Pages: **85-93**	**Factorization theorems for the stability of bifurcating solutions** D.D. Joseph *Keywords:* *Abstract:* The theory of bifurcation at a simple complex eigenvalue, developed for ordinary differential equations by Hopf 1942 and extended to partial differential equations, like the Navier-Stokes equations, by Joseph and Sattinger 1972, using Hopf's methods... *Directory:* **76_1 !-MISSING PRINT** *Note:* Lecture Notes in Mathematics, A Dold, B Eckmann, eds. Springer-Verlag	Record Place: 59
1975 Submitted: 1974 ***J. Fluid Mech.*** Editor: Vol: **69** Issue:**3** Pages: **475-511**	**The rotating rod viscometer** G.S. Beavers, D.D. Joseph *Keywords:* *Abstract:* This paper reports the development of practical methods of viscometry to characterize non-Newtonian fluids in slow flow. It is shown that measurements of the free surface near rods rotating in STP and polyacrylamide are accurate, reproducible, and in... *Directory:* **75_2** *Note:*	Record Place: 58
1975 Submitted: 1974 ***J. Fluid Mech.*** Editor: Vol: **69** Issue:**3** Pages: **565-589**	**The free surface on a liquid filing a trench heated from its side** D.D. Joseph, L. Sturges *Keywords:* *Abstract:* In this paper we compute the motion and the shape of the free surface on a liquid in a trench heated from its side. The analysis is based on Joseph's Lagrangian theory of domain perturbations, which is developed in general and through simple examples... *Directory:* **75_1** *Note:* Leroy Sturges, AEM UM	Record Place: 57
1975 Submitted: ***ARMA*** Editor: Vol: **58** Issue:**4** Pages: **369-380**	**Stability of bifurcating time-periodic and steady solutions of arbitrary amplitude** D.D. Joseph, D.A. Nield *Keywords:* *Abstract:* The theory of bifurcation at a simple complex eigenvalue, developed for ordinary differential equations by Hopf 1942 and extended to partial differential equations, like the Navier-Stokes equations, by Joseph & Sattinger 1972, is a local theory which.. *Directory:* **75_4** *Note:*	Record Place: 56
1975 Submitted: ***ARMA*** Editor: Vol: **59** Issue:**4** Pages: **359-387**	**Slow motion and viscometric motion, Part V: the free surface on a simple fluid flowing down a tilted trough** L. Sturges, D.D. Joseph *Keywords:* *Abstract:* This paper is a contribution to the theory of viscometry of slow steady motions of a simple fluid and is presented as Part V of the work on slow motion and viscometric motion which formed the subject of the paper in four parts of Joseph 1974. *Directory:* **75_3** *Note:*	Record Place: 55
1974 Submitted: 1974 ***ARMA*** Editor: Vol: **56** Issue: Pages: **99-157**	**Slow motion and viscometric motion; stability and bifurcation of the rest state of a simple fluid** D.D. Joseph *Keywords:* *Abstract:* This paper is divided into four loosely connected parts whose common thread is the study of slow steady motion of a simple fluid. The motions to be considered are those which can be constructed as a perturbation series pivoted about a state of rest. ... *Directory:* **74_5** *Note:*	Record Place: 54
1974 Submitted: 1973	**Friction factors in the theory of bifurcating Poiseuille flow through annular ducts**	Record Place: 53

J. Fluid Mech. Editor: Vol: **66** Issue:**1** Pages: **189-207**	D.D. Joseph, T.S. Chen *Keywords:* *Abstract:* The objective of this paper is to show how to formulate a bifurcation theory for pipe flows in terms of the friction factor. We compute the slope of the friction factor vs. Reynolds number curve and the frequency change for the time periodic solution ... *Directory:* **74_2** *Note:* Chen: U of Missouri Rolla, Rolla	
1974 Submitted: 1973 ***Physics of Fluids*** Editor: Vol: **17** Issue:**3** Pages: **650-651**	**Tall Taylor cells in polyacrylamide solutions** G.S. Beavers, D.D. Joseph *Keywords:* *Abstract:* The behavior of Taylor cells in a polyacrylamide solution contained between rotating cylinders is described. As the rotational speed increases, the cell aspect ratio changes from about 1 to 4. Hysteresis of the 4-cell configuration is observed. *Directory:* **74_1** *Note:* copyright 1974 American Institute of Physics	Record Place: 52
1974 Submitted: ***ARMA*** Editor: Vol: **53** Issue:**2** Pages: **101-130**	**Repeated supercritical branching of solutions arising in the variational theory of turbulence** D.D. Joseph *Keywords:* *Abstract:* In the variational theory of statistically stationary turbulence one seeks bounds on the difference between the response of laminar and turbulent flow when the steady external forces driving the flow are specified. For example, the difference between ... *Directory:* **74_4** *Note:*	Record Place: 51
1974 Submitted: ***Adv. Applied Mech.*** Editor: Vol: **14** Issue: Pages: **241-277**	**Response curves for plane Poiseuille flow** D.D. Joseph *Keywords:* *Abstract:* A response function for a fluid motion can be defined as a scalar function that measures the response of the flow to the external forces which induce the motion. For example, in problems of thermal convection, the response function can be taken as ... *Directory:* **74_3** *Note:* Academic Press, Inc. (NY, San Francisco, London).	Record Place: 50
1973 Submitted: 1972 ***J. Fluid Mech.*** Editor: Vol: **57** Issue:**3** Pages: **491-514**	**Bounds for heat transport in a porous layer** V.P. Gupta, D.D. Joseph *Keywords:* *Abstract:* Strongly nonlinear heat transport across a porous layer is studied using Howard's (1963) variational method. The analysis explores a bifurcation property of Busse's (1969) multi-alpha solution of this variational problem and complements the 1972 study ... *Directory:* **73_5** *Note:*	Record Place: 49
1973 Submitted: 1972 ***ARMA*** Editor: Vol: **49** Issue:**5** Pages: **381-401**	**The free surface on a liquid between cylinders rotating at different speeds; Part II** D.D. Joseph, G.S. Beavers, R.L. Fosdick *Keywords:* *Abstract:* Chapt IV. The rise of fluid on a rod rotating in a large vat. The detailed agreement between theory and experiment which we shall display here leaves open the possibility that standard experiments on climbing can be so designed to determine accurately ... *Directory:* **73_4** *Note:*	Record Place: 48
1973 Submitted: 1972 ***ARMA*** Editor: Vol: **49** Issue:**5** Pages: **321-380**	**The free surface on a liquid between cylinders rotating at different speeds; Part I** D.D. Joseph, R.L. Fosdick *Keywords:* *Abstract:* When a liquid in a vessel rotates as a rigid body, the free surface on top of the liquid is shaped by the requirements of a balance of forces arising from centripetal accelerations, gravity, and surface tension. In the absence of relative internal motion, *Directory:* **73_3** *Note:*	Record Place: 47
1973 Submitted: 1972	**Subcritical bifurcation of plane Poiseuille flow** T.S. Chen, D.D. Joseph	Record Place: 46

J. Fluid Mech. Editor: Vol: **58** Issue:**2** Pages: **337-351**	*Keywords:* *Abstract:* We apply the perturbation theory which was recently developed and justified by Joseph & Sattinger (1972) to determine the form of the time-periodic solutions which bifurcate from plane Poiseuille flow. The results at lowest significant order seem to be in *Directory:* **73_1** *Note:* Chen: Dept Mech. Aerospace Engrg, U of Missouri-Rolla	
1973 Submitted: ***ARMA*** Editor: Vol: **51** Issue:**4** Pages: **295-303**	**Domain perturbations: The higher order theory of infinitesimal water waves** D.D. Joseph *Keywords:* *Abstract:* The higher order theory of infinitesimal water waves refers to a perturbation theory which represents solutions to problems in the theory of nonlinear water waves as a power series in the amplitude of the wave. The infinitesimal wave appears in this theory *Directory:* **73_7** *Note:*	Record Place: 45
1973 Submitted: ***ARMA*** Editor: Vol: **49** Issue:**4** Pages: **241-269**	**Quasilinear Dirichlet problems driven by positive sources** D.D. Joseph, T.S. Lundgren *Keywords:* *Abstract:* We study the problem (r^(n-1)u')' + lambd r^(n-1) F(u)=0 where F(u)>0 when u>=0. Our main concern is with functions F(u)=(1+alpha u)^beta, alpha beta>0 and with F(u)=e^u. The last secton... deals with solutions of (I.1) when F(u) is Lipschitz continuous.. *Directory:* **73_6** *Note:*	Record Place: 44
1973 Submitted: ***Nonlinear Problems in Physical Science and Engineering*** Editor: Joseph, Sattinger, Stakgold, eds., Springer Lecture Notes in Mathematics Vol: Issue: Pages: **1-30**	**Remarks about bifurcation and stability of quasi-periodic solutions which bifurcate from periodic solutions of the Navier Stokes equations** D.D. Joseph *Keywords:* *Abstract:* L.D. Landau (1944) and E. Hopf (1948) have conjectured that the transition to turbulence may be described as repeated branching of quasi-periodic solutions into quasi-periodic solutions with more frequencies. The simplest case is the bifurcation of ... *Directory:* **73_2** *Note:* hand note, title: Nonlinear Problems in the Physical Sciences and BIOLOGY, 1972 (?)	Record Place: 43
1972 Submitted: 1971 ***J. Fluid Mech.*** Editor: Vol: **54** Issue:**3** Pages: **521-543**	**Bounds for heat transport in a porous layer** F.H. Busse, D.D. Joseph *Keywords:* *Abstract:* Bounds on the heat transport in a porous layer are derived using the variational method of Howard 1963 and Busse 1969b. The relatively simple structure of the variational problem in the case of prorous convection allows one to formulate the theory ... *Directory:* **72_3** *Note:* Busse: Dept of Planetary and Space Sciences, U of Calf, Los Angeles	Record Place: 42
1972 Submitted: 1971 ***J. Fluid Mech.*** Editor: Vol: **51** Issue:**3** Pages: **593-612**	**Global stability of spiral flow; Part 2** W.L. Hung, D.D. Joseph, B.R. Munson *Keywords:* *Abstract:* The stability of spiral flow between rotating and sliding cylinders is considered. In the limit of narrow gap, a 'modified' energy theory is constructed. This theory exploits the consequences of assuming the existence of a preferred spiral direction ... *Directory:* **72_2** *Note:* Hung, Joseph: AEM, UM. Munson: Duke U	Record Place: 41
1972 Submitted: ***ARMA*** Editor: Vol: **45** Issue:**2** Pages: **79-109**	**Bifurcating time periodic solutions and their stability** D.D Joseph, D.H. Sattinger *Keywords:* *Abstract:* Equilibrium configurations of mechanical systems are often characterized by stability parameters, such as the Reynolds number R in fluid mechanics. When R is small, the equilibrium configuration is stable; but when R is raised to a certain critical value *Directory:* **72_4** *Note:* Sattinger: also UM?	Record Place: 40
1972 Submitted:	**Energy stability of hydromagnetic flow** D.D. Joseph	Record Place: 39

Proceedings of Conference on Mathematical Topics in Stability Theory, March 29-31, 1971 at Washington State Univ. Editor: Vol: Issue: Pages: **1-12**	*Keywords:* *Abstract:* The governing equations of motion for a viscous fluid with constant density rho and finite conductivity sigma flowing in a magnetic field are dU/dt=1/(rho mu) B.nablaB - .., dB/dt=B.nabla U + 1/(sigma mu) .., and nabla.U=nabla.B=0 where B is the magnetic *Directory:* **72_1** *Note:*	
1971 Submitted: 1971 ***J. Fluid Mech.*** Editor: Vol: **49** Issue:**2** Pages: **305-318**	**Viscous incompressible flow between concentric rotating spheres; Part 2, Hydrodynamic stability** B.R. Munson, D.D. Joseph *Keywords:* *Abstract:* The energy theory of hydrodynamic stability is applied to the viscous incompressible flow of a fluid contained between two concentric spheres which rotate about a common axis with prescribed angular velocities. The critical Reynolds number is calculated.. *Directory:* **71_5** *Note:* Munson: Dept Mech. Engrg, Duke Univ., Durham, NC	Record Place: 38
1971 Submitted: 1970 ***J. Fluid Mech.*** Editor: Vol: **49** Issue:**2** Pages: **289-303**	**Viscous incompressible flow between concentric rotating spheres; Part 1, Basic flow** B.R. Munson, D.D. Joseph *Keywords:* *Abstract:* The steady motion of a viscous fluid contained between two concentric spheres which rotate about a common axis with different angular velocities is considered. A high-order analytic perturbation solution, through terms of order Re^7, is obtained for low R *Directory:* **71_3** *Note:* Munson: Dept Mech. Engrg, Duke Univ., Durham NC	Record Place: 37
1971 Submitted: 1970 ***J. Fluid Mech.*** Editor: Vol: **47** Issue:**2** Pages: **257-282**	**Stability of convection in containers of arbitrary shape** D.D. Joseph *Keywords:* *Abstract:* When a container of fluid of arbitrary shape is heated from below and the temperature gradient exceeds a critical value (Rc2) the conduction solution with no motion becomes unstable and is replaced by convection. The convection may have two forms: one with 'upflow' at the centre of the container and one with 'downflow' there. Here we study the stability of the two forms of convection. *Directory:* **71_2** *Note*	Record Place: 36
1971 Submitted: ***ARMA*** Editor: Vol: **44** Issue:**1** Pages: **1-22**	**Contributions to the nonlinear theory of stability of viscous flow in pipes and between rotating cylinders** D.D. Joseph, W. Hung *Keywords:* *Abstract:* Three component disturbance vector fields of the title flows, which are constant along a distinguished direction, imply the existence of a component of disturbance velocity which is not driven by disturbance pressure. This fact implies the existence of two *Directory:* **71_4** *Note:*	Record Place: 35
1971 Submitted: ***Instability of Continuous Systems, IUTAM Symposium September 1969*** Editor: Vol: Issue: Pages: **132-142**	**On the place of energy methods in a global theory of hydrodynamic stability** D.D. Joseph *Keywords:* *Abstract:* The point of departure for the global theory to be described is the system of the nonlinear Boussinesq equations (1,2) governing the disturbance of some given motion. For simplicity, let (U,T,Gamma) be a basic steady velocity, temperature and concen' ... *Directory:* **71_1** *Note:* DDJ at Imperial College of Science and Technology, London, UK	Record Place: 34
1970 Submitted: 1969 ***J. Fluid Mech.*** Editor:	**Global stability of spiral flow** D.D. Joseph, B.R. Munson *Keywords:* *Abstract:* Energy and linear limits are calculated for the Poiseuille-Couette spiral motion	Record Place: 33

Vol: **43** Issue:**3** Pages: **545-575**	between concentric cylinders which rotate rigidly and rotate and slide relative to one another. The addition of solid rotation can bring the linear limit down ... *Directory:* **70_3** *Note:*	
1970 Submitted: 1967 ***Physics of Fluids*** Editor: Vol: **13** Issue:**2** Pages: **217-221**	**Linear instability of asymmetric flow in channels** T.S. Fu, D.D. Joseph *Keywords:* *Abstract:* A study of the linear stability of asymmetric channel flows is presented. Three one-parameter families of basic velocity which possess, respectively, no, one, and two inflection points are treated. The competing effects of stabilizing asymmetry and destab *Directory:* **70_4** *Note:* TS Fu, DDJ in IT, MN	Record Place: 32
1970 Submitted: ***ARMA*** Editor: Vol: **36** Issue:**4** Pages: **285-292**	**Global stability of the conduction-diffusion solution** D.D. Joseph *Keywords:* *Abstract:* This paper continues and, to a degree, completes the working out of an energy-stability theory for the thermosolutal conduction-diffusion solution of the Boussinesq equations [1,2,3]. The Boussinesq equations allow a steady conduction diffusion solution.. *Directory:* **70_2** *Note:*	Record Place: 31
1970 Submitted: ***Quarterly J. Applied Math.*** Editor: Vol: **28** Issue: Pages: **327-342**	**Nonlinear diffusion induced by nonlinear sources** D.D. Joseph, E.M. Sparrow *Keywords:* *Abstract:* In the published literature dealing with a number of diverse scientific and technological problems, one encounters the mathematical system nabla^2psi+lambda g(x)Phi(psi)=0 in R, ... *Directory:* **70_1** *Note:* Sparrow: UM	Record Place: 30
1969 Submitted: 1968 ***J. Fluid Mech.*** Editor: Vol: **36** Issue:**4** Pages: **721-734**	**Eigenvalue bounds for the Orr-Sommerfeld equation; Part 2** D.D. Joseph *Keywords:* *Abstract:* Rigorous estimates of amplification rates, wave speeds and sufficient conditions for linear stability are derived for the manifold of solutions of the Orr- Sommerfeld problem governing parallel motion in the boundary layer and in round pipes. ... *Directory:* **68_5** *Note:*	Record Place: 29
1969 Submitted: 1967 ***Quarterly J. Applied Math.*** Editor: Vol: **26** Issue:**4** Pages: **575-599**	**Stability of Poiseuille flowing pipes, annuli, and channels** D.D. Joseph, S. Carmi *Keywords:* *Abstract:* The value of R=180 which has been given by Orr [1] as a limit for sure stability of Hagen-Poiseuille flow is incorrect. A lower value, R=82.88, can be associated with an eigenfunction possessing a first mode azimuthal variation (N=1) and no streamwise var *Directory:* **69_2** *Note:* Carmi: UM	Record Place: 28
1969 Submitted: ***ARMA*** Editor: Vol: **35** Issue:**3** Pages: **169-177**	**Uniqueness criteria for the conduction-diffusion solution of the Boussinesq quations** D.D. Joseph *Keywords:* *Abstract:* Energy stability theory gives sufficient conditions for the exponential stability of basic fluid motions [1]. If the basic motion is steady, the energy criterion is also sufficient for uniqueness [2]. However, since it is sufficient to guarantee ... *Directory:* **69_3** *Note:*	Record Place: 27
1969 Submitted: ***ARMA*** Editor: Vol: **33** Issue:**2** Pages: **116-138**	**Existence of convective solutions of the generalized Benard problem which are analytic in their norm** P.C. Fife, D.D. Joseph *Keywords:* *Abstract:* The generalized nonlinear Benard problem defined below, like the standard Benard problem itself, possesses a unique, motionless, conduction-solution when the parameters lie within a restricted range. This solution, however, bifurcates at certain ... *Directory:* **69_1** *Note:*	Record Place: 26

1968 Submitted: 1968 ***J. Fluid Mech.*** Editor: Vol: **33** Issue:**3** Pages: **617-621**	**Eigenvalue bounds for the Orr-Sommerfeld equation** D.D. Joseph *Keywords:* *Abstract:* Estimates of the eigenvalues C belonging to the manifold of solutions of the Orr-Sommerfeld equation are constructed by application ofelementary isoperimetric inequalities. The inequalities also lead to a considerable improvement on the estimate of (a-R) *Directory:* **68_1** *Note:*	Record Place: 25
1968 Submitted: 1967 ***Physics of Fluids*** Editor: Vol: **11** Issue:**4** Pages: **903-904**	**Subcritical instability and exchange of stability in a horizontal fluid layer** D.D. Joseph, R.J. Goldstein, D.J. Graham *Keywords:* *Abstract:* Rayleigh numbers calculated from linear and energy theories do not coincide when internal heat sources are present. For free boundaries exchange of stability applies, but energy theory nonetheless deems possible the existence of subcritical instabilities. *Directory:* **68_2** *Note:* all in IT, UM	Record Place: 24
1968 Submitted: 1966 ***Physics of Fluids*** Editor: Vol: **11** Issue:**10** Pages: **2065-2073**	**Stability of parallel flow between concentric cylinders** J.E. Mott, D.D. Joseph *Keywords:* *Abstract:* The linear stability of parallel flow in a concentric annulus to infinitesimal, axially symmetric disturbances in considered. First, the Poiseuille flow in annular cylinders is studied with the ratio k of the outer to inner cylinder as a parameter... *Directory:* **68_4** *Note:* Mott: Nuclear Engineering Dept, Univ. of Tennessee, Knoxville, Tennessee	Record Place: 23
1968 Submitted: ***ARMA*** Editor: Vol: **30** Issue:**1** Pages: **38-80**	**Convective instability in a temperature and concentration field** C.C. Shir, D.D. Joseph *Keywords:* *Abstract:* In chemically homogeneous fluids, density differences induced by thermal gradients can drive fluid motions. If, in addition, there is a concentration gradient, e.g., a salt gradient or a gradient of water vapor in air, then the density variations ... *Directory:* **68_3** *Note:*	Record Place: 22
1967 Submitted: 1967 ***J. Fluid Mech.*** Editor: Vol: **30** Issue:**1** Pages: **197-207**	**Boundary conditions at a naturally permeable wall** G.S. Beavers, D.D. Joseph *Keywords:* *Abstract:* Experiments giving the mass efflux of a Poiseuille flow over a naturally permeable block are reported. The efflux is greatly enhanced over the value it would have if the block were impermeable, indicating the presence of a boundary layer in the block. ... *Directory:* **67_1** *Note:*	Record Place: 21
1967 Submitted: 1966 ***Quarterly J. Applied Math.*** Editor: Vol: **25** Issue:**2** Pages: **163-173**	**Parameter values excluded by existence conditions for buoyant dissipative motions in vertical channels** D.D. Joseph, W.H. Warner *Keywords:* *Abstract:* The nonexistence of steady, fully-developed solutions for frictionally heated buoyant flow in vertical channels is established analytically. Explicit bounds on the values of parameters beyond which solutions to this nonlinear problem cannot exist are ... *Directory:* **67_2** *Note:*	Record Place: 20
1967 Submitted: ***ARMA*** Editor: Vol: **24** Issue:**5** Pages: **325-351**	**Parameter and domain dependence of eigenvalues of elliptic partial differential equations** D.D. Joseph *Keywords:* *Abstract:* It is our purpose in this paper to exploit the technique of parameter differentiation for studying the calculus of eigenvalues. The study of the domain dependence of eigenvalues is emphasized, but not exclusively, and dependence of eigenvalues on other... *Directory:* **67_3** *Note:*	Record Place: 19
1966	**Evaluation of Tietjens function in stability calculations**	Record Place:

Submitted: ***Physics of Fluids*** Editor: Vol: **9** Issue:**12** Pages: **2519-2520**	T.S. Chen, D.D. Joseph, E.M. Sparrow *Keywords:* *Abstract:* The Tietjens function is re-expressed as a ratio of rapidly converging power series of its (complex) argument which may be utilized to replace tables or graphs in the calculation of critical Reynolds numbers from asymptotic theory. *Directory:* **66_5** *Note:*	18
1966 Submitted: ***J. Fluid Mech.*** Editor: Vol: **26** Issue:**4** Pages: **769-777**	**Subcritical convective instability; Part 2. Spherical shells** D.D. Joseph, S. Carmi *Keywords:* *Abstract:* In this paper we consider the effect of internal heat generation and a spatial variation of the gravity field on the onset of thermal convection in spherical shells. If the temperature gradient and gravity fields have the same spatial variation, ... *Directory:* **66_4** *Note:* Shlomo Carmi	Record Place: 17
1966 Submitted: ***J. Fluid Mech.*** Editor: Vol: **26** Issue:**4** Pages: **753-768**	**Subcritical convective instability; Part 1, Fluid layers** D.D. Joseph, C.C. Shir *Keywords:* *Abstract:* This paper elaborates on the assertion that energy methods provide an always mathematically rigorous and a somes physically precise theory of subcritical convective instability. The general theory, without explicit solutions, is used to deduce that .. *Directory:* **66_3** *Note:*	Record Place: 16
1966 Submitted: ***ARMA*** Editor: Vol: **22** Issue:**3** Pages: **163-184**	**Nonlinear stability of the Boussinesq equations by the method of energy** D.D. Joseph *Keywords:* *Abstract:* The linear theory of hydrodynamic stability suffers from the defect that one cannot, in principle make judgements regarding the growth potential of finite disturbances. Thus, one cannot say for certain that a given flow will remain stable if disturbed.. *Directory:* **66_2** *Note:*	Record Place: 15
1966 Submitted: ***Quarterly J. Applied Math.*** Editor: Vol: **23** Issue:**4** Pages: **349-354**	**Bounds on lambda for positive solutions of** $\Delta\psi + \lambda\int(\rho)\{\psi + G(\psi)\} = 0$ D.D. Joseph *Keywords:* *Abstract:* We shall show that when G(psi) >= G(0) =1 and psi satisfies typical conditions on the closed (sufficiently smooth) boundary S of an open n dimensional region v, the values of lambda > 0 for shiwh the title equation has positive solutions… *Directory:* **66_1** *Note:*	Record Place: 14
1966 Submitted: ***J. Applied Mech.*** Editor: Vol: **33** Issue: Pages: **753-761**	**Lubrication of a porous bearing -- Stokes' solution** D.D. Joseph, L.N. Tao *Keywords:* *Abstract:* Coupling of flows induced by the rotation of an infinite cylinder in an eccentric cylindrical hole in a fluid-saturated porous space is investigated in the context of a coupled boundary-value problem in which the Stokes flow outside porous regions and *Directory:* **65_5** *Note:*	Record Place: 13
1966 Submitted: ***J. Applied Mech.*** Editor: Vol: **33** Issue: Pages: **761-167**	**Lubrication of a porous bearing -- Reynolds' solution** C.C. Shir, D.D. Joseph *Keywords:* *Abstract:* The problem of lubrication of a journal in a porous bearing is considered. A Reynolds equation modified to accommodate mass transfer with the fluid-saturated bearing is solved, and the influence of the permeability and radius ratio of the bearing is exami *Directory:* **65_4** *Note:*	Record Place: 12
1965 Submitted: 1964	**Ground flow induced by a moving cylinder**	Record Place: 11

Physics of Fluids Editor: Vol: **8** Issue:**8** Pages: **1438**	D.D. Joseph, L.N. Tao *Keywords:* *Abstract:* Ground flow induced by rotation and translation of a solid cylinder is investigated in the context of a coupled boundary-value problem in which the Stokes flow outside porous regions and the arcy flow inside porous regions are connected by the continuity *Directory:* **65_3** *Note:*	
1965 Submitted: 1964 ***Int. J. Heat Mass Transfer*** Editor: Vol: **8** Issue: Pages: **281-288**	**Non-linear heat generation and stability of the temperature distribution in conducting solids** D.D. Joseph *Keywords:* *Abstract:* The effect of non-linear dependence of resistance on temperature on the Joulean production of heat in electrically conducting systems is investigated. The theory is compared with well-known linear theories. In common conducting materials there exists... *Directory:* **64_3** *Note:*	Record Place: 10
1965 Submitted: 1963 ***Developments in Mechanics, Proceedings of the 8th Midwestern Mechanics Conference at Case Institute of Technology, April 1-3, 1963*** Editor: Vol: Issue: Pages: **403-404**	**Unsteady Free and Forced Convection in Vertical Annular and Annular Sector Tubes** D.D. Joseph, L.N. Tao *Keywords:* *Abstract:* In this investigation solutions to the problem of unsteady laminar forced and free convection in coaxial sector tubes in the presence of a constant axial temperature gradient have been developed. The solutions admit phenomena of oscillation and resonance which are not usually present in flows in which the dissipative mechanisms of heat conduction and viscosity are important. Several numerical examples are constructed and used to discuss the "dashpot" features of the solutions. *Directory:* **65_10** *Note:*	Record Place: 9
1965 Submitted: ***Physics of Fluids*** Editor: Vol: **8** Issue:**12** Pages: **2195-2200**	**Stability of frictionally-heated flow** D.D. Joseph *Keywords:* *Abstract:* Extended results relative to the existence of a critical stress (a finite shear stress or pressure gradient above which fully-developed steady solutions do not exist) in Couette and Poiseuille motions are reported. The results apply to liquids under gener *Directory:* **65_2** *Note:*	Record Place: 8
1965 Submitted: ***ARMA*** Editor: Vol: **20** Issue:**1** Pages: **59-71**	**On the stability of the Boussinesq equations** D.D. Joseph *Keywords:* *Abstract:* In this paper we generalize the method of energy to discuss the stability of thermally-driven convective flows governed by the Boussinesq equations. The energy method as applied to non-convective flows has the striking advantage that it may be applied to *Directory:* **65_1** *Note:*	Record Place: 7
1965 Submitted: ***Quarterly J. Mech. Applied Math.*** Editor: Vol: **18** Issue:**3** Pages:	**Note on steady flow induced by rotation of a naturally permeable disc** D.D. Joseph *Keywords:* *Abstract:* Coupled flow induced by the steady rotation of a fluid saturated, naturally permeable and infinite disk is compared with the flow induced by the rotation of an otherwise impermeable disk over which a uniform suction has been prescribed. The coupled proble *Directory:* **65_11** *Note:*	Record Place: 6
1964 Submitted: 1964 ***Physics of Fluids*** Editor: Vol: **7** Issue:**11** Pages: **1761-1771**	**Variable Viscosity Effects on the Flow and Stability of Flow in Channels and Pipes** D.D. Joseph *Keywords:* *Abstract:* Variable viscosity and frictionally heated channel and pipe flows are investigated. The solutions are bounded and improved estimates of the critical stress	Record Place: 5

	(beyond which there are no steady solutions) developed. The stress first increases, then decreases, with increasing maximum temperature. At this stress maximum there is a neutral solution and neighboring unstable solutions to an associated stability problem. Points of inflection in the velocity profile can develop in Poiseuille flows and must develop in Couette flows. The Poiseuille profiles which develop are inviscidly unstable in channels but stable in pipes. *Directory:* **64_2** *Note:*	
1964 Submitted: 1963 ***Zeitschrift AMM*** Editor: Vol: **44** Issue:**8** Pages: **361-364**	**The Effect of Permeability on the Slow Motion of a Porous Sphere in a Viscous Liquid** D.D. Joseph, L.N. Tao *Keywords:* *Abstract:* A technique is suggested by which the effects of permeable materials on the low Reynolds number flow of viscous liquids may be evaluated. In particular, we show that Darcy's law and the asymptotic equations (Re->0) of Stokes may be used to formulate boundary value problems generating solutions valid for both porous and non-porous regions and matched at common boundaries. The coupled problem of the streaming of a viscous liquid past a permeable sphere is considered and closed solutions which depend simply on the permeability on the sphere are derived. The drag on a permeable sphere is shown to be the same as the drag on an impermeable sphere of reduced radius. *Directory:* **64_1** *Note:*	Record Place: 4
1964 Submitted: 1963 ***Physics of Fluids*** Editor: Vol: **7** Issue:**5** Pages: **648-651**	**Incompatibility of Beltrami Flow with Viscous Adherence** D.D. Joseph *Keywords:* *Abstract:* Boundary conditions on the vorticity are deduced to infer conditions under which Beltrami flows of a viscous fluid are possible. The inconsistency of steady and unsteady Beltrami flow with adherence to rigid surfaces is established for a broad class of rigid motions of the bounding surfaces. The implications of isochoric motions are explored, and the possibility of an isochoric Beltrami motion of a Newtonian fluid is eliminated for rigid translatory motions of the boundary surface. The inconsistency of Beltrami Blows of any fluid with rotation about an axis of geometric symmetry is also established. It is shown that the adherence condition implies either a vanishing or infinite vorticity at boundary surfaces for certain kinematically possible types of Beltrami motions. *Directory:* **64_10** *Note:*	Record Place: 3
March **1963** Submitted: 1962 ***J. Applied Mech.*** Editor: Vol: Issue: Pages: **147-148**	**Transverse Velocity Components in Fully Developed Unsteady Flows** D.D. Joseph, L.N. Tao *Keywords:* *Abstract:* It is known that if an incompressible fluid is confined to straight pipe or channel, and if the axial velocity is steady and fully developed, then, under certain very general conditions, no transverse velocity components can exist. This conclusion is not valid for unsteady flows, and it is the purpose of this note to develop the appropriate restrictions for the unsteady case. *Directory:* **63_1** *Note:*	Record Place: 2
1962 Submitted: ***J. Applied Mech.*** Editor: Vol: **29** Issue: Pages: **1-5**	**Fluid flow between porous rollers** L.N. Tao, D.D. Joseph *Keywords:* *boundary layer control* *Abstract:* The problem of fluid flow between two porous rollers with a small gap is investigated. Solutions for both large and small values of the porosity of the minimum gap distance are derived. It is found that increasing porosity will decrease the maximum suction and shift its position away from the origin. *Directory:* **62_1** *Note:*	Record Place: 1
3-1987 Submitted: ***MISSING INFO*** Editor: Vol: Issue: Pages: **107-122**	**Hyperbolicity, change of type, wave speeds and related matters** D.D. Joseph *Keywords:* *Abstract:* In this paper I will review some consequences of instantaneous elasticity for the numerical analysis of flows of viscoelastic liquids. I will consider situations which are associated with hyperbolic waves of vorticity. T vorticity equation may change type *Directory:* **87_1**	

	Note: photocopy in binder 5, no citation info... :(	