

Bibliography

- AL-SAMIEH, M. F. & RAHNEJAT, H. 2002 Physics of lubricated impact of a sphere on a plate in a narrow continuum to gaps of molecular dimensions. *J. Phys. D: Appl. Phys.* **35**, 2311–2326.
- ARDEKANI, A. M. & RANGEL, R. H. 2008 Numerical investigation of particle-particle and particle-wall collisions in a viscous fluid. *J. Fluid Mech.* **576**, 437–466.
- BAGCHI, P. & BALACHANDAR, S. 2003 Inertial and viscous forces on a rigid sphere in a straining flow at moderate reynolds numbers. *J. Fluid Mech.* **481**, 105–148.
- BARNOCKY, G. & DAVIS, R. H. 1988 Elastohydrodynamic collision and rebound of spheres: experimental verification. *Phys. Fluids* **31** (6), 1324–1329.
- BARNOCKY, G. & DAVIS, R. H. 1989 The influence of pressure-dependent density and viscosity on the elastohydrodynamic collision and rebound of two spheres. *J. Fluid Mech.* **209**, 501–519.
- BASSET, A. 1888 A treatise on hydrodynamics. *Deighton Bell* **2**.
- BEYER, R.P. & LEVEQUE, R.J. 1992 Analysis of a one-dimensional model for the immersed boundary method. *SIAM J. Numer. Anal.* **29** (2), 332–364.
- BOUSSINESQ, J. 1885 Sur la rsistance qu'oppose un fluide indfini au repos, sans pesanteur, au mouvement vari d'une sphre solide qu'il mouille sur toute sa surface, quand les vitesses restent bien continues et assez faibles pour que leurs carrs et produits soient ngligeables. *C. R. Acad. Sci. Paris* (100), 935.
- BRENNER, H. 1961 The slow motion of a sphere through a viscous fluid towards a plane surface. *Chem. Eng. Sci.* **16**, 242–251.

- CHANG, W., GIRALDO, F. & PEROT, B. 2002 Analysis of an exact fractional step method. *J. Comput. Phys.* **180**, 183–199.
- CHAPLIN, J. R. 1999 History forces and the unsteady wake of a cylinder. *J. Fluid Mech.* **393**, 99–121.
- CLIFT, R., GRACE, J. R. & WEBER, M. E. 1978 *Bubbles, Drops and Particles*. Academic Press.
- COIMBRA, C. F. M., L'ESPÉRANCE, D., LAMBERT, R. A., TROLINGER, J. D. & RANGEL, R. H. 2004 An experimental study on stationary history effectes in high frequency stokes flows. *J. Fluid Mech.* **504**, 353–363.
- COLONIUS, T. & TAIRA, K. 2008 A fast immersed boundary method using a nullspace approach and multi-domain far-field conditions. *Comput. Methods Appl. Mech. Engrg.* **197**, 2131–2146.
- COX, R. & BRENNER, H. 1967 The slow motion of a sphere through a viscous fluid towards a plane surface ii: Small gap widths, including inertial effects. *Chem. Eng. Sci.* **22**, 1753–1777.
- CROWE, C., SOMMERFELD, M. & TSUJI, Y. 1998a *Multiphase flows with droplets and particles*. CRC Press.
- CROWE, C., SOMMERFELD, M. & TSUJI, Y. 1998b *Multiphase flows with droplets and particles*. Florida: CRC Press.
- DAVIS, R. H., SERAYSSOL, J. & HINCH, E. J. 1986 The elastohydrodynamic collision of two spheres. *J. Fluid Mech.* **163**, 479–497.
- GLOWINSKI, R., PAN, T.W. & PERIAUX, J. 1998 Distributed lagrange multiplier methods for incompressible viscous flow around moving rigid bodies. *Comput. Method Appl. Mech. Engrg.* **151**, 181–194.
- GONDRET, P., LANCE, E. HALLOUINAND M. & PETIT, L. 1999 Experiments on the motion of a solid sphere toward a wall: From viscous dissipation to elastohydrodynamic bouncing. *Physics of Fluids* **11** (9), 2803–2805.

- GONDRET, P., LANCE, M. & PETIT, L. 2002 Bouncing motion of spherical particles in fluids. *Physics of Fluids* **14** (2), 643–652.
- HERTZ, H. 1882 Ueber die beruhrung fester elastischer korper (on the contact of elastic solids). *Journal reine und angewandte Mathematik* p. 156.
- HINCH, E. J. 1993 The approach to steady state in oseen flows. *J. Fluid Mech* **256**, 601–604.
- JOHNSON, K. L. 1985 *Contact Mechanisc*. Cambridge University Press.
- JOHNSON, T. A. & PATEL, V. C. 1999 Flow past a sphere up to a reynolds number of 300. *J. Fluid Mech.* **378**, 19–70.
- JOSEPH, G. 2003 Collisional dynamics of macroscopic particles in a viscous fluid. PhD thesis, California Institute of Technology.
- JOSEPH, G. G. & HUNT, M. L. 2004 Oblique particle-wall collisions in a liquid. *J. Fluid Mech.* **510**, 71–93.
- JOSEPH, G. G., ZENIT, R., HUNT, M. L. & ROSENWINKEL, A. M. 2001 Particle-wall collisions in a viscous fluid. *J. Fluid Mech.* **443**, 329–346.
- KIM, I., ELGHOBASHI, S. & SIRIGNANO, W. A. 1998 On the equation for sphericalparticle motion: effect of reynolds and acceleration numbers. *J. Fluid Mech* **367**, 221–253.
- LAI, M. & PESKIN, C.S. 2000 An immersed boundary method with formal second-order accuracy and reduced numerical viscosity. *J. Comput. Phys.* **160**, 705–719.
- LAWRENCE, C. J. & MEI, R. W. 1995 Long-term behaviour of the drag on a body in impulsive motion. *J. Fluid Mech* **283**, 2307–2327.
- LEWEKE, T., THOMPSON, M. C. & HOURIGAN, K. 2004 Vortex dynamics associated with the collision of a sphere with a wall. *Physics of Fluids* **16** (9).
- LIAN, G., ADAMS, M. J. & THORNTON, C. 1996 Elastohydrodynamic collision of solid spheres. *J. Fluid Mech.* **311**, 141–152.

LORENZINI, G. & MAZZA, N. 2004 *Debris Flow Phenomenology and Rheological Modelling*. WIT Press.

LOVALENTI, P. M. & BRADY, J. F. 1993 The hydrodynamic force on a rigid particle undergoing arbitrary time-dependent motion at small reynolds numbers. *J. Fluid Mech.* **256**, 561–605.

LUNDBERG, J. & SHEN, H. H. 1992 Collisional restitution dependence on viscosity. *J. Eng. Mech.* **118**, 979.

MCLAUGHLIN, M. H. 1968 An experimental study of particlewall collision relating to flow of solid particles in a fluid. Engineer's degree thesis, California Institute of Technology.

MEI, R. & ADRIAN, R. J. 1992 Flow past a sphere with an oscillation in the free-stream velocity and unsteady drag at finite reynolds number. *J. Fluid Mech.* **237**, 323–341.

MICHAELIDE, E. E. 1997 Reviewthe transient equation of motion for particles, bubbles, and droplets. *Trans, ASME: J. Fluids Eng.* **119**, 223–247.

MILNE-THOMSON, L. M. 1968 *Theoretical hydrodynamics*, 5th edn. New York: Dover Publications.

MITTAL, R. & IACCARINO, G. 2005 Immersed boundary methods. *Annu. Rev. Fluid Mech.* **37**, 239–261.

NGUYEN, N.-Q. & LADD, A.J.C. 2002 Lubrication corrections for lattice-boltzmann simulations of particle suspensions. *Physical Review E* **66** (046708).

PESKIN, C. S. 1972 Flow patterns around heart valves: a numerical method. *J. Comput. Phys.* **10**, 252–271.

ROMA, A. M., PESKIN, C. S. & BERGER, M. J. 1999 An adaptive version of the immersed boundary method. *J. Comput. Phys.* **153**, 509–534.

RUIZ-ANGULO, A. & HUNT, M. L. 2010 Measurements of the coefficient of restitution for particle collisions with ductile surfaces in a liquid. *Granular Matter* In press.

- STOKES, G.G. 1851 On the effect of the internal friction of fluids on the motion of pendulums. *Transactions of the Cambridge Philosophical Society* **9** (8).
- STOKES, G. G. 1880 *Collected Mathematical and Physical papers*. Cambridge University Press.
- TAIRA, K. 2008 The immersed boundary projection method and its application to simulation and control of flows around low-aspect-ratio wings. PhD thesis, California Institute of Technology.
- TAIRA, K. & COLONIUS, T. 2007 The immersed boundary method: A projection approach. *J. Comput. Phys.* **225**, 2118–2137.
- TENCATE, A., NIEUWSTAD, C. H., DERKSEN, J. J. & AKKER, H. E. A. VAN DEN 2002 Particle imaging velocimetry experiments and lattice-boltzmann simulations on a single sphere settling under gravity. *Physics of Fluids* **14** (11).
- THOMPSON, M. C., LEWEKE, T. & HOURIGAN, K. 2007 Sphere-wall collisions: vortex dynamics and stability. *J. Fluid Mech.* **575**, 121–148.
- WELLS, J.C. 1993 Mathematical modelling of normal collision of smooth elastic sphere in liquid. *Powders and Grains* pp. 45–50.
- YANG, F.-L. 2006 Interaction law for a collision between two solid particles in a viscous liquid. PhD thesis, California Institute of Technology.
- YANG, F.-L. & HUNT, M. L. 2006 Dynamics of particle-particle collisions in a viscous liquid. *Physics of Fluids* **18** (121506).
- ZENIT, R. & HUNT, M. L. 1999 Mechanics of immersed particle collisions. *Trans. ASME: J. Fluid Engng* **121** (1), 179–184.