

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Simulation of axisymmetric particle collision in a liquid environment¹ XIAOBAI LI, MELANY HUNT, TIM COLONIUS, Division of Engineering and Applied Science, California Institute of Technology — Particle collisions in a liquid environment play an important role in the study of liquid-solid flows. This talk focuses on the collisional process and presents simulations of the coupled motion of a solid particle and surrounding liquid. The simulations use a multi-grid immersed boundary method with axisymmetric coordinates to investigate the normal collision between a rigid sphere and a wall. When the distance between the sphere and the wall decreases to a criteria value, a damping force based on elastohydrodynamic lubrication theory is introduced to reproduce the impacting and rebounding process. The model is compared with experimental measurements of the restitution coefficients for a range of Stokes numbers. The long term goal of this work is to develop collisional strategies that can be incorporated into simulations involving many particles in a viscous fluid.

¹This work is supported by NSF grant CTS-0314005.

Melany Hunt
Division of Engineering and Applied Science,
California Institute of Technology

Date submitted: 03 Aug 2007

Electronic form version 1.4