Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

An embedded boundary formulation for fluid structure interactions of elastically mounted rigid bodies[1] JIANMING YANG, ELIAS BALARAS, Dept. Mechanical Engineering, University of Maryland, College Park, MD 20742 — We will present an embedded-boundary formulation that is applicable to fluid structure interactions of elastically mounted rigid bodies. In this approach, the Navier-Stokes equations for incompressible flow are solved on fixed Cartesian grids with the immersed moving bodies treated using a second-order sharp- interface embedded boundary method. The ODE's governing the rigid body motions are solved using Hamming's fourth-order predictor-corrector method. A strong coupling scheme is adopted, where the fluid and the structure are treated as elements of a single dynamical system, and all of the governing equations are integrated simultaneously, and interactively in the time-domain. Vortex-induced vibrations of a circular cylinder with one and two degrees-of-freedom are studied and the results are in good agreement with reference experiments and simulations. The interactions of multiple elastic cylinders have also been simulated to demonstrate the robustness of the proposed approach in cases involving multiple bodies.

[1]Research supported by the National Science Foundation (Grant CTS-0347011)

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Date submitted: 04 Aug 2005 Electronic form version 1.4