



UNIVERSITY OF NOTRE DAME

AEROSPACE AND MECHANICAL ENGINEERING

SEMINAR ANNOUNCEMENT

- SPEAKER:** Professor Rajat Mittal
Mechanical and Aerospace Engineering
Director, GW Center for Biomimetics and Bioinspired Engineering (COBRE)
The George Washington University
Washington, DC
- TOPIC:** High-Fidelity Computational Modeling Of Moving-Boundary And
Fluid-Structure Interaction Problems In Biological Flows
- DATE:** Tuesday, April 29, 2008
- TIME:** 3:30 p.m.
- PLACE:** 138 DeBartolo Hall

Abstract

Complex moving boundaries and fluid-structure interaction is a hallmark of biological flow configurations. Computational modeling of such flows however poses a severe challenge for conventional modeling approaches and the last decade has seen a tremendous rise in the popularity of immersed-boundary methods (IBM) for modeling such flows. The key feature of the immersed boundary method is that simulations with complex moving boundaries can be carried out on stationary, body non-conformal Cartesian grids. This approach eliminates the need for complicated re-meshing algorithms that are usually employed with conventional body-conformal methods. In our presentation we will describe the salient features of a versatile Cartesian grid-based immersed-boundary method which is especially well suited for biological flows. The IBM method developed here is accurate, efficient, scaleable and fast, and can handle extremely complex, moving geometries with relative ease. The solver is being used in a number of studies including fish locomotion, human swimming, insect flight and fluid-structure interaction in the human larynx, and results from these studies will be presented.