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Coast to Cosmos Lecture Series

Immersed Boundary Methods for Simulating Fluid-structure Interaction**Fotis Sotiropoulos, Stony Brook University**

Dean, College of Engineering and Applied Sciences

Digital Media Center 1034
February 02, 2016 - 12:00 pm**Abstract:**

Fluid-structure interaction (FSI) problems commonly encountered in engineering and biological applications involve geometrically complex flexible or rigid bodies undergoing large deformations. Immersed boundary (IB) methods have emerged as a powerful simulation tool for tackling such flows due to their inherent ability to handle arbitrarily complex bodies without the need for expensive and cumbersome dynamic re-meshing strategies. Depending on the approach such methods adopt to satisfy boundary conditions on solid surfaces they can be broadly classified as diffused and sharp interface methods. In this talk I will outline a powerful sharp-interface IB computational framework we have developed in my group for simulating complex FSI problems encountered in a broad range of applications in engineering and biology. I will demonstrate the capabilities of the method by presenting simulation results from various problems, including vortex-induced vibrations, aquatic swimming, cardiovascular fluid mechanics and wind and marine and hydrokinetic energy.

Speaker's Bio:

Fotis Sotiropoulos is the Dean of the College of Engineering and Applied Sciences (CEAS) at Stony Brook University (SBU) as of October 2015. Prior to joining SBU Dr. Sotiropoulos was the James L. Record Professor of Civil, Environmental and Geo-Engineering, and Director of the St. Anthony Falls Laboratory at the University of Minnesota, Twin Cities. Prior to that, Dr. Sotiropoulos was on the faculty of the School of Civil and Environmental Engineering at the Georgia Institute of Technology, with a joint appointment in the G. W. Woodruff School of Mechanical Engineering. His research focuses on simulation-based engineering science for fluid mechanics problems in renewable energy, environmental, biological, and cardiovascular applications. Funded by the National Science Foundation, the Department of Energy, the National Institutes of Health, the Sandia National Laboratories, private industry, and other state and federal agencies, Sotiropoulos has raised over \$37M in externally-sponsored funds for research and research facility development and renovation. He is a Fellow of the American Physical Society (APS), has authored over 170 peer reviewed journal papers and book chapters, has twice won the APS Division of Fluid Dynamics Gallery of Fluid Motion (2009, 2011), and is also a recipient of a Career Award from the National Science Foundation. He is also a 2014 distinguished lecturer of the Mortimer and Raymond Sackler Institute of Advanced Studies at Tel Aviv University and is serving or has served on the editorial boards of several journals.

