Date: **March 2nd**

Time: **11:00 AM**

Location: **Maryland Hall 110**

Speaker: **Dr. Fotis Sotiropoulos**
University of Minnesota

Title: **"Numerical simulation of fluid-structure interaction problems in biological fluid mechanics"**

Abstract

The term biological fluid mechanics (or biofluids) refers to the study of fluid flows in and around living organisms in order to elucidate and quantify presumed links between fluid mechanics and particular biological responses and biochemical processes or specific behavioral and/or evolutionary patterns. Examples highlighting the diversity of this broad, cross-disciplinary area range from the interaction of the aquatic habitat with turbulence in natural and engineered environments to the role that blood-vessel scale hemodynamics play in stimulating disease-inducing biochemical processes at the cellular level in the cardiovascular system. In this talk I will highlight the role of Computational Fluid Dynamics (CFD) as a powerful biofluids research tool and review our recent work towards the development of an advanced Fluid-Structure Interaction (FSI) computational framework for tackling a broad range of biofluids problems involving multiple, arbitrarily complex deformable bodies. The FSI algorithm is based on a novel modeling paradigm that integrates boundary-conforming curvilinear grids with sharp-interface, immersed boundary methodologies. The versatility and predictive capabilities of this algorithm will be demonstrated by presenting results from its application to simulate fish and plankton swimming and physiologic blood flow in prosthetic heart valves and complex, surgically created, blood-vessel anatomies.