

# SAFL SEMINAR SERIES

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ST. ANTHONY FALLS LABORATORY ~ AUDITORIUM

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## Fluid-Structure Interaction (FSI): Method, Applications



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*Abstract:* Over the past decades, problems involving the coupled response of structures and flows have become of increasing interest in various engineering areas such as aeronautical engineering, coastal engineering, and biomedical engineering. Due to nonlinear properties of fluid and deformable structures, only numerical approaches can be used to solve such problems. Simulation of the fluid-structure interaction where the dynamics of these flows dominates poses a formidable challenge to even the most advanced numerical techniques, and is currently at the forefront of ongoing work in computational fluid dynamics. I will talk about approaches and techniques for solving FSI problems. Among common existing methods to solve FSI problems, an efficient technique with a focusing on modeling of large displacements/deformations of thin shells in the fluid flow will be discussed. This technique is based on the combination of Hybrid Immersed Boundary Method (HIBM) as a fluid solver and Finite Element Method (FEM)/Material Point Method (MPM) as a solid structure solver. The proposed method is a powerful tool to investigate complex FSI problems and has been applied to a wide number of FSI problems. I will provide some bioengineering and aeronautical engineering applications examples that have been modeled by this methodology.