Long time behavior in a flow-structure interaction

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Abstract

Flow-structure interactions are ubiquitous in nature. Problems such as attenuation of turbulence or flutter in an oscillating structure [Tacoma bridge] are prime examples of relevant applications. Mathematically, the models are represented by a 3 D Euler Equation coupled to a nonlinear dynamic elasticity on a 2 D manifold. Strong boundary-type coupling at the interface between the two media is at the center of the analysis. This provides for a rich mathematical structure, opening the door to several unresolved problems in the area of nonlinear PDEs, dynamical systems and related harmonic analysis and geometry. This talk aims at providing a brief overview of recent developments in the area along with a presentation of some recent advances addressing the issues of control and long time behavior [partial structural attractors] subject to mixed boundary conditions arising in modeling of the interface between the two environments.