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Title: Can we control oscillations in flow-structure interactions?

Abstract Flow-structure interactions are ubiquitous in nature and in everyday life. Flow or fluid by interacting with structural elements can lead to oscillations, hence impacting stability or even safety. Thus problems such as attenuation of turbulence or flutter in an oscillating structure [Tacoma bridge], flutter in tall buildings, fluid flows in flexible pipes, in nuclear engineering flows about fuel elements and heat exchanger vanes are just few prime examples of relevant applications which place themselves at the frontier of interests in applied mathematics. In this lecture we shall describe mathematical models describing the phenomena, These 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 PDE's, dynamical systems, related harmonic analysis and differential geometry. This talk aims at providing a brief overview of recent developments in the area along with a presentation of some new methodology addressing the issues of asymptotic control to coherent structure and stability of the relevant dynamics. .