

Numerical modelling of fluid-structure interaction phenomena: from direct simulation to stability and sensitivity analyses.

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Abstract. Fluid-structure interaction is present in many natural and engineering systems. This type of interaction has great importance in a number of energy conversion and propulsion devices, and at the same time it is responsible for vibration and motion of structures that can ultimately lead to failure. Therefore, understanding the physical mechanisms that drive the interaction and predicting the responses of the structure and the flow may enable more efficient design and control strategies. Numerical modelling and simulation has been largely employed as a tool with this objective. However, the coupling between the fluid and structure often poses new challenges whose solution require novel methods and approaches. In this talk, a general framework to understand and analyse fluid-structure interaction problems will be given, and the main numerical methods used to model and simulate them are going to be presented. In addition, state-of-the-art tools to assess stability, sensitivity and receptivity of fluid-structure systems will be introduced.