Intelligent Adaptive Fluid-Structure Interaction Systems

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Abstract: It is proposed to review various computational methodologies for linear fluid-structure dynamic (vibrations/transient problems) occuring for instance in liquid-propelled launch vehicles or in wing tanks of aircraft flexible structures. After an analysis of free surface gravity/incompressibility effects in tanks partially filled with an inviscid liquid using the concept of elastogravity operators, we examine the compresssibility effects and its interaction with gravity. Reduction procedues (component modes/dynamic substructuring extended to weak and strong interaction of physical subsystems) are then reviewed. Those reduction methodologies are of prime importance for hybrid passive/active interface treatment for dynamic attenuation problems. In a first step, dissipative viscous model is introduced, then we present various hybrid passive-viscoelastic/activepiezoelectric interface analysis treatment.