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Intelligent adaptive fluid-structure interaction systems

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It is proposed to review various computational methodologies for linear fluid-structure dynamic (vibrations/transient problems) occurring for instance in liquid-propelled launch vehicles or in wing tanks of aircraft flexible structures [1]. After an analysis of free surface gravity/incompressibility effects in tanks partially filled with an inviscid liquid [2, 3] using the concept of elastogravity operators, we examine the compressibility effects and its interaction with gravity [4]. Reduction procedures (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 [6, 7], then we present various hybrid passive-viscoelastic/active-piezoelectric interface analysis treatment such as those presented in [8, 9, 10].

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