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Acoustic Coupling to Kelvin-Helmholtz Instability at a Discontinuity Layer of Zero and Finite Thickness and Viscosity ORLANDO UGARTE, V'YACHESLAV AKKERMAN, West Virginia University — The analytical formulation of Funada and Joseph [J. Fluid.Mech. 445 (2001) 263] on the Kelvin-Helmholtz (KH) instability developing at a surface separating two fluids is extended to the event of imposed acoustics field by means of the Bychkov method [Phys. Fluids 11 (1999) 3168]. Specifically, acoustical modification, mitigation and stabilization of the KH instability as well as the excitation of the parametric instability by sound waves are considered. The limits for stable/unstable regimes as a function of hydrodynamic and acoustic parameters are determined considering a linear dispersion relation for the perturbed interface. Two interacting modes are of particular interest: resonant and parametric, characterized by their frequency in relation to the disturbance oscillation. We start with an infinitely thin approach of the discontinuity surface, which is subsequently extended to a finite thickness layer (i.e. continuous velocity and density gradients are considered). A parametric study of the influence of surface tension and viscosity to the KH-acoustic coupling and stability limits is also performed.

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