

Virial Theorem and Its Applications in Instability of Two-Phase Water-Wave

lundi 17 juin 2024 11:40 (20 minutes)

We analyze the dynamics of two layers of immiscible, inviscid, incompressible, and irrotational fluids through a full nonlinear system. Our goal is to establish a virial theorem and prove the polynomial growth of slope and curvature of the interface over time when the fluid below is no denser than the one above. These phenomena, known as Rayleigh-Taylor instability and Kelvin-Helmholtz instability, will be proved for a broad class of regular initial data, including the case of 2D overlapping interface.

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Classification de Session: Présentations