

Simulations of Cryogenic Cavitation of Low Temperature Fluids with Thermodynamics Effects

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Abstract : Cavitation in cryogenic liquids is widely present in contemporary science. In the current study, we re-examine a previously validated acoustic cavitation model which was developed for a gas bubble in liquid water. Furthermore, simulations of cryogenic fluids including the thermal effect, the effect of acoustic pressure amplitude and the frequency of sound field on the bubble dynamics are presented. A gas bubble (Helium) in liquids Nitrogen, Oxygen and Hydrogen in an acoustic field at ambient pressure and low temperature is investigated numerically. The results reveal that the oscillation of the bubble in liquid Hydrogen fluctuates more than in liquids Oxygen and Nitrogen. The oscillation of the bubble in liquids Oxygen and Nitrogen is approximately similar.

Keywords : cryogenic liquids, cavitation, rocket engineering, ultrasound

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