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How important is the liquid bulk viscosity effect on the dynamics of a single cavitation bubble?

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Abstract

The influence of liquid bulk viscosity on the dynamics of a single cavitation bubble is numerically studied via Gilmore model with a new modified boundary condition at bubble interface. In order to more accurately describe the interior gas thermodynamics, a hydrochemical model is used. The numerical results for an argon bubble in water and aqueous H_2SO_4 show that including the liquid bulk viscosity slightly affects the bubble dynamics in collapse phase. This effect becomes significant only at high ultrasonic amplitudes and high viscosities. Moreover, the maximum pressure value inside the bubble is much more influenced than the maximum temperature. This finding lends support to results of Shen et al. [25] and significantly differ from some previous results reported in the literature.

Keywords: Cavitation bubble; Bulk viscosity; Gilmore model

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