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The effects of bubble-bubble interactions on pressures and temperatures produced by bubbles collapsing near a rigid surface SHAHABODDIN ALAHYARI BEIG, ERIC JOHNSEN, Univ of Michigan - Ann Arbor — Cavitation occurs in a wide range of hydraulic applications, and one of its most important consequences is structural damage to neighboring surfaces following repeated bubble collapse. A number of studies have been conducted to predict the pressures produced by the collapse of a single bubble. However, the collapse of multiple bubbles is known to lead to enhanced collapse pressures. In this study, we quantify the effects of bubble-bubble interactions on the bubble dynamics and pressures/temperatures produced by the collapse of a pair of bubbles near a rigid surface. For this purpose, we use an in-house, high-order accurate shock- and interface-capturing method to solve the 3D compressible Navier-Stokes equations for gas/liquid flows. The non-spherical bubble dynamics are investigated and the subsequent pressure and temperature fields are characterized based on the relevant parameters entering the problem: stand-off distance, geometrical configuation, collapse strength. We demonstrate that bubble-bubble interactions amplify/reduce pressures and temperatures produced at the collapse, and increase the non-sphericity of the bubbles and the collapse time, depending on the flow parameters.

Shahaboddin Alahyari Beig
Univ of Michigan - Ann Arbor

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