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Inertial collapse of bubble pairs near a solid surface[1] SHAHABODDIN ALAHYARI BEIG, ERIC JOHNSEN, University of Michigan — Cavitation occurs in a variety of applications ranging from naval structures to biomedical ultrasound. One important consequence is structural damage to neighboring surfaces following repeated inertial collapse of vapor bubbles. Although the mechanical loading produced by the collapse of a single bubble has been widely investigated, less is known about the detailed dynamics of the collapse of multiple bubbles. In such a problem, the bubble-bubble interactions typically affect the dynamics, e.g., by increasing the non-sphericity of the bubbles and amplifying/hindering the collapse intensity depending on the flow parameters. Here, we quantify the effects of bubble-bubble interactions on the bubble dynamics, as well as the pressures/temperatures produced by the collapse of a pair of gas bubbles near a rigid surface. We perform high-resolution simulations of this problem by solving the three-dimensional compressible Navier-Stokes equations for gas/liquid flows. The results are used to investigate the non-spherical bubble dynamics and characterize the pressure and temperature fields based on the relevant parameters entering the problem: stand-off distance, geometrical configuration (angle, relative size, distance), collapse strength.

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