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Numerical simulations of single-bubble collapse in liquid metal[1]

ERIC JOHNSEN, University of Michigan, Ann Arbor — Bubble collapse following a thermal shock in liquid mercury is investigated to understand the resulting cavitation erosion. A conservative high-order accurate interface- and shock-capturing scheme is used to carry out direct simulations of the three-dimensional collapse of a single bubble. Both the shock-induced collapse due to the propagating shock and acoustic waves and the inertial Rayleigh collapse of a cavitation bubble are studied in stationary and laminar flow configurations near a rigid wall. The non-spherical collapse and emitted shock waves are characterized for the given configurations. The stresses measured along the solid surface provide indications of the potential damage of bubble collapse and are related to the erosion patterns observed experimentally in the Spallation Neutron Source at Oak Ridge National Laboratory.

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