Abstract Submitted
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Dynamics of a vapor nanobubble collapsing near a solid boundary[1] CARLO MASSIMO CASCIOLA, FRANCESCO MAGALETTI, MIRKO GALLO, GIORGIA SINIBALDI, LUCA MARINO, Dipartimento di Ingegneria Meccanica e Aerospaziale, Universit di Roma La Sapienza — The collapse of a nano-bubble near a solid wall is addressed exploiting a phase field model (Magaletti et al., Phys. Rev. Lett. 2015). The dynamics, triggered by a shock wave in the liquid, is explored for different conditions. It is characterized by a sequence of collapses and rebounds of the pure vapor bubble accompanied by the emission of shock waves in the liquid. The shocks are reflected by the wall to impinge back on the re-expanding bubble. The presence of the wall and the impinging shock wave break the symmetry of the system, leading, for sufficiently strong intensity of the incoming shock wave, to the poration of the bubble and the formation of an annular structure and a liquid jet Intense peaks of pressure and temperatures are found also at the wall, confirming that the strong localized loading combined with the jet impinging the wall is a potential source of substrate damage induced by the cavitation (Magaletti et al., J. Multiphase Flows 2016). Comparison of the numerical results with recent experiments on the collapse of a Laser induced cavitation bubble will also be discussed.

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