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Nucleation pressure threshold in acoustic droplet vaporization¹ CHRISTOPHER MILES, CHARLES DOERING, OLIVER KRIPFGANS, University of Michigan - Ann Arbor — We combine classical nucleation theory with superharmonic focusing to predict necessary pressures to induce nucleation in acoustic droplet vaporization. We show that linear acoustics is a valid approximation to leading order when particle displacements in the sound field are small relative the radius of the droplet. This is done by perturbation analysis of an axisymmetric compressible inviscid flow about a droplet with small surface perturbations relative to the mean radius subjected to an incoming ultrasonic wave. The necessary nucleation pressure threshold inside the droplet is calculated to be -9.33 ± 0.30 MPa for typical experimental parameters by employing results from *classical homogeneous nucleation theory*. As a result we are able to predict if a given incident pressure waveform will induce nucleation.

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