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Cavitation Inception on Micro-particles: a Self Propelled Particle Accelerator

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Corrugated, hydrophilic particles with diameters between $30\,\mu$m and $150\,\mu$m are found to cause cavitation inception at their surfaces when they are exposed to a short, intensive tensile stress wave. The growth of cavity and its interaction with the original nucleating particle is recorded by means of digital imaging. The growing cavity accelerates the particle into translatory motion until the tensile stress decreases, and subsequently the particle separates from the cavity. The cavity growth and particle detachment are modeled by considering the momentum of the particle and the displaced liquid. The analysis suggests that all particles which cause cavitation are accelerated into translatory motion, and separate from the cavities they themselves nucleate.

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