Cavitation inception from bubble nuclei

The tensile strength of ordinary water such as tap water or seawater is typically well below 1 bar. It is governed by cavitation nuclei in the water, not by the tensile strength of the water itself, which is extremely high. Different models of the nuclei have been suggested over the years, and experimental investigations of bubbles and cavitation inception have been presented. These results suggest that cavitation nuclei in equilibrium are gaseous voids in the water, stabilized by a skin which allows diffusion balance between gas inside the void and gas in solution in the surrounding liquid. The cavitation nuclei may be free gas bubbles in the bulk of water, or interfacial gaseous voids located on the surface of particles in the water, or on bounding walls. The tensile strength of these nuclei depends not only on the water quality but also on the pressure-time history of the water. A recent model and associated experiments throw new light on the effects of transient pressures on the tensile strength of water, which may be notably reduced or increased by such pressure changes.