

**ACOUSTICS2008/1629****Introduction of a compliant gas-layer serves to mitigate damage to solid surfaces from the collapse of cavitation bubble clouds**

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The collapse of transient bubble clouds near a boundary was investigated. Transient cavitation bubbles were created using a shock-wave lithotripter. A porous ceramic disk (flow-pressure 7.5psi) was placed at the lithotripter focus. Air was forced through the disk to alter the boundary condition at the ceramic disk's proximal face. Gas pressure below 7.5psi resulted in a ceramic disk partially filled with fluid (rigid boundary); gas pressure over 7.5psi resulted in active bubbling at the proximal face (compliant boundary). Cavitation dynamics of bubble clouds near ceramic disks were studied for varying gas pressures (0-10psi). Images of the collapse were obtained from a high-speed camera. Additionally, a passive cavitation detector (3.5MHz focused transducer) was aligned with the lithotripter focus. Both the images and the acoustic measurements indicated that bubble clouds near a rigid boundary collapse onto the boundary, forming a re-entrant liquid jet whose impact leads to surface erosion. When a compliant boundary is introduced, bubble clouds collapse away from the surface, thus mitigating cavitation damage. The damage to the ceramic disks was quantified using micro-CT imaging. [Supported by the ORNL Spallation Neutron Source, which is managed by UT-Battelle, LLC, under contract DE-AC05-00OR22725 for the U.S. Department of Energy.]