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Void collapse under distributed dynamic loading near material interfaces[1] GALINA SHPUNTOVA, JOANNA AUSTIN, University of Illinois at Urbana-Champaign — Collapsing voids cause significant damage in diverse applications from biomedicine to underwater propulsion to explosives. While shock-induced void collapse has been studied extensively, less attention has been devoted to stress wave loading, which will occur instead if there are mechanisms for wave attenuation or if the impact velocity is relatively low. A set of dynamic experiments was carried out in a model experimental setup to investigate the effect of acoustic heterogeneities in the surrounding medium on void collapse. Two tissue-surrogate polymer materials of varying acoustic properties were used to create flowfield geometries involving a boundary and a void. A stress wave, generated by projectile impact, triggered void collapse in the gelatinous polymer medium. When the length scales of features in the flow field were on the same order of magnitude as the stress wave length scale, the presence of the boundary was found to affect the void collapse process relative to collapse in the absence of a boundary. This effect was quantified for a range of geometries and impact conditions using a two-color, single-frame particle image velocimetry technique.

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