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Implosion of Cylindrical Cavities via Short Duration Impulsive Loading JUSTIN HUNEAULT, ANDREW HIGGINS, McGill University — An apparatus has been developed to study the collapse of a cylindrical cavity in gelatin subjected to a symmetric impact-driven impulsive loading. A gas-driven annular projectile is accelerated to approximately 50 m/s, at which point it impacts a gelatin casting confined by curved steel surfaces that allow a transition from an annular geometry to a cylindrically imploding motion. The implosion is visualized by a high-speed camera through a window which forms the top confining wall of the implosion cavity. The initial size of the cavity is such that the gelatin wall is two to five times thicker than the impacting projectile. Thus, during impact the compression wave which travels towards the cavity is closely followed by a rarefaction resulting from the free surface reflection of the compression wave in the projectile. As the compression wave in the gelatin reaches the inner surface, it will also reflect as a rarefaction wave. The interaction between the rarefaction waves from the gelatin and projectile free surfaces leads to large tensile stresses resulting in the spallation of a relatively thin shell. The study focuses on the effect of impact parameters on the thickness and uniformity of the imploding shell formed by the cavitation in the imploding gelatin cylinder.

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