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Development of a Gas-Driven Implosion Device for the Study of Rayleigh-Taylor Instability in Gelatin Cylinders ANDREW HIGGINS, JUSTIN HUNEAULT, McGill University — The study of Rayleigh-Taylor (RT) instability growth on the inner surface of imploding cylinders is relevant to a number of inertial confinement and magnetized target fusion schemes. More specifically, the feedthrough of perturbations on the outer surface of the cylinder to its inner surface can be a limiting factor in the convergence and compression provided by implosion schemes. A number of studies have been performed on gas-driven gelatin rings, providing an accessible manner to study the RT instability in a converging geometry. In this study, we present the development of a novel apparatus which uses the single point initiation of a detonable gas mixture that then wraps around a central plate to symmetrically implode gelatin cylinders. The implosion is visualized by high speed camera through a viewing window. The ability to independently vary the initial driving pressure and the internal cavity pressure, as well as the cylinder thickness, the initial perturbation size and mode number allows for the study of a wide range of feedthrough regimes. Of particular interest is the cylinder deceleration phase, where the gas in the cavity begins to decelerate the inner cylinder surface, leading to rapid growth of perturbations on the now RT unstable interface.

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