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Simulations advancing 2D Laser Driven Shock Experiments[1] RAYMOND LI, PATRICK ADRIAN, GRAEME SUTCLIFFE, TIMOTHY JOHNSON, MIT PSFC, KEITH NELSON, THOMAS PEZERIL, MIT Keith Nelson Group, STEVEN KOOI, MIT Institute for Soldier Nanotechnologies, RICHARD PETRASSO, CHIKANG LI, MIT PSFC — Laser driven cylindrically or spherically focused shocks in fluids are a topic of great interest due to their wide variety of applications, including studies of materials in extreme conditions, sonoluminescence, synthesis of new materials, and controlled fusion. A novel platform for generating 2D focusing shocks uses a laser to shock a liquid or soft solid layer between two glass plates [T. Pezeril et al., PRL 2011]. This platform was demonstrated to generate pressure in excess of 30 GPa at shock convergence. In this work, we investigate methods to increase the maximum pressure at the shock focus through simulations of the experiments. The effect of changing the geometry of the glass was investigated. Utilizing a lensed glass shape increased the pressure at the center of the shock wave by over 30 times. The thickness of the liquid layer and the radius of the shocked region were also varied to find optimal conditions for maximum pressure. These simulations are guiding ongoing experiments that will study high pressure materials and fusion sources in a 2D geometry. This work was supported in part by the U.S. DOE and the MIT/NNSA CoE.

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