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Stochastic analysis and robust optimization for a converging shock wave experimental setting DANTE DE SANTIS, Stanford Univ, GIANLUCA GERACI, Stanford Univ and Inria Bordeaux, PIETRO CONGEDO, Inria Bordeaux — The efficient generation of ultrahigh pressure is one of the key issues in research related to high energy density physics, as for example Inertial Confinement Fusion reactions. In order to create more stable converging shock configurations, recently, it has been proposed to shape the shock front by the means of obstacles. Such polygonal-shaped shocks are expected to be less sensitive to external disturbances that circular ones, but at the same time obstacles produce a loss of energy during the focusing process of the shocks. The aim of this work is to perform a robust shape optimization of the obstacles by taking into account several experimental uncertainties, thus yielding a more stable and efficient shock configuration. For this purpose, both inviscid and viscous turbulent solvers are coupled with a Polynomial Chaos method. This analysis allows estimating the variability of the maximal temperature and energy. Finally, obstacle shape is optimized in order to maximize the energy concentration and thus provide useful remarks for improving the experience. The effect of neglecting viscous terms in the optimization process is also investigated.

Dante De Santis
Stanford Univ

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