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Optimization on the focusing of multiple shock waves. SHI QIU, University of Southern California, VERONICA ELIASSON, University of Southern California University of California, San Diego — Focusing of multiple shock waves can lead to extreme thermodynamic conditions, which are desired for applications like shock wave lithotripsy and inertial confinement fusion. To study shock focusing effects, multiple energy sources have been placed in a circular pattern around an intended target, while the distance between each source and the target is fixed. All the sources are set to release the same amount of energy at the same time in order to create multiple identical shock waves. The object is to optimize the thermodynamic conditions at the target by rearranging the initial placement of each source. However, dealing with this optimization problem can be challenging due to the high computational cost introduced by solving the Euler equations. To avoid this issue, both numerical and analytical methods have been applied to handle shock focusing more efficiently. A numerical method, an approximate theory named Geometrical Shock Dynamics (GSD), has been utilized to describe the motion of shock. Using an analytical method, a transition curve between regular and irregular reflection has been employed to predict shock interactions. Results show that computational cost can be reduced dramatically by combining GSD and a transition curve. In addition, optimization results based on varying initial setups is discussed.

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