

Shaping Converging Shock Waves by Means of Obstacles

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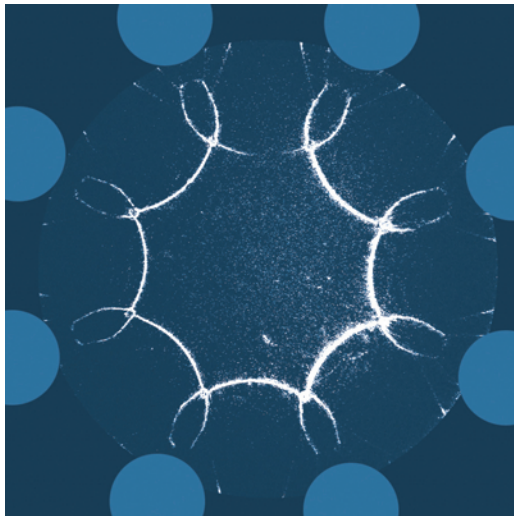


Fig. 1. A converging shock wave with concave sides in an octagonal pattern, $t = t_0$.

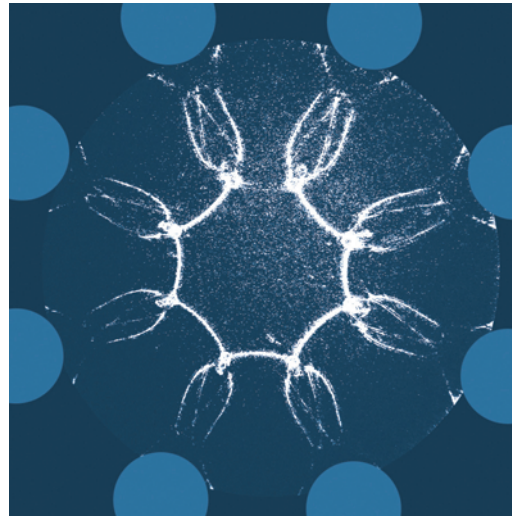


Fig. 2. Converging shock wave, $t = t_0 + 5 \mu\text{s}$.

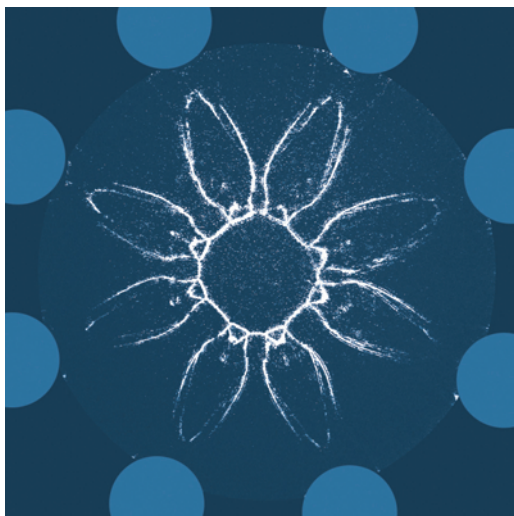


Fig. 3. Converging shock wave with 16 sides, $t = t_0 + 10 \mu\text{s}$.

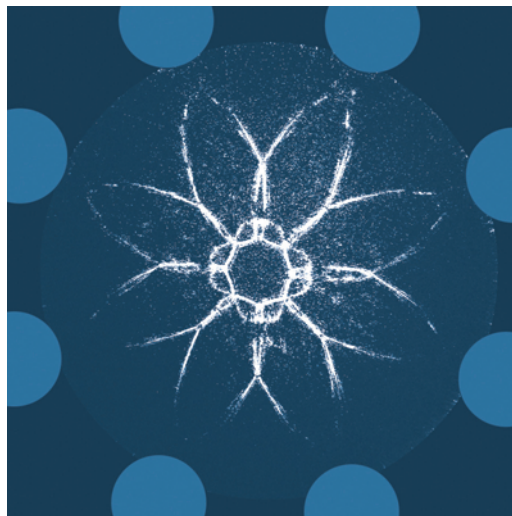


Fig. 4. Converging shock wave with 8 sides oriented opposite to Fig. 1, $t = t_0 + 16.5 \mu\text{s}$.

The schlieren photographs show a cylindrical converging shock wave at different time instants. Eight cylindrical obstacles, with diameters of 15 mm, are placed in an octagonal pattern to create octagonally shaped shock waves. At first, eight concave forward sides are created, Fig. 1 and 2. The concave sides will first get plane and then the shock wave will transform into a double octagon, Fig. 3. After some time it will transform back into an octagon again, with opposite orientation relative to the first one, Fig. 4. This behavior will repeat during the whole focusing process and depends on the nonlinear coupling between the local form of the shock front and the local propagation velocity.