

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Shaping converging shock waves MALTE KJELLANDER, VERONICA ELIASSON, NILS TILLMARK, NICHOLAS APAZIDIS, KTH Mechanics —
Converging shock waves can be used for generation of high temperatures and pressures. The optimal shape of a shock is the completely circular, which is unstable for stronger shocks. The instability distorts the wavefront and plane sections appear. The new shape is an asymmetric wave that does not focus to a distinct point. This ability to produce plane surfaces can be used to stabilize the shocks. Numerical calculations show that symmetric polygonal shock waves are stable and behave like circular shocks, in the sense that the Mach number increase similarly. An exception is the triangular shock, for which the Mach number approaches an asymptotic value. Experiments have been made to verify the analytical and numerical results. The work has been conducted in a shock tube designed for studies of converging shock waves. The tube creates converging cylindrical shocks which are shaped by small objects placed inside the test section. One square and one triangular configuration have been investigated. Experiments show a different behaviour between the two. While the square shock experiences a periodical transformation, the triangular shock keeps its original shape and orientation.

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Date submitted: 02 Aug 2007

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