

Abstract Submitted
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Spontaneous shock-shock and singularity formation on perturbed planar shock waves¹ W. MOSTERT, D.I. PULLIN, California Institute of Technology, R. SAMTANEY, King Abdullah University of Science and Technology, V. WHEATLEY, University of Queensland — We discuss the evolution of perturbed planar gas-dynamic and magnetohydrodynamics shock waves. An asymptotic closed form solution of the equations of geometrical shock dynamics (GSD) based on spectral analysis is described that predicts a time to loss of analyticity in the profile of a plane propagating shock wave subject to a smooth, spatially-periodic shape and Mach number perturbation of arbitrarily small magnitude. The shock shape remains analytic only up to a finite, critical time that is found to be inversely proportional to a measure of the initial perturbation amplitude. It is also shown that this analysis can also be applied to strong, fast MHD shocks in the presence of an external magnetic field whose field lines are parallel to the unperturbed shock. The relation between this critical time and the numerical detection of the time to formation of shock-shocks (Mostert et al., JFM. 2017) will be discussed.

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