Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Evolution of perturbed planar shock waves[1] DALE PULLIN, NAIJIAN SHEN, California Institute of Technology, RAVI SAMTANEY, King Abdullah University of Science and Technology, VINCENT WHEATLEY, University of Queensland — We consider the evolution of a planar gas-dynamic shock wave subject to smooth initial perturbations in both Mach number and shock-shape profile. A complex-variable formulation for the general shock motion is developed based on an expansion of the Euler equations proposed by Best [*Shock Waves*, **1**, 4, (1991)], The zeroth-order truncation of Best's system corresponds to the equations of Whitham's geometrical shock dynamics (GSD) while higher-order corrections provide a hierarchical description that can be closed at any order, as detailed initial flow conditions for the flow immediately behind the shock are prescribed. Solutions to the first- and second-order closure of Best's system for the evolution of planar perturbations are explored numerically to investigate the development of a finite-time singularity in the shock shape profile. Results are compared to those obtained using GSD [Mostert *et al.*, *J. Fluid Mech.*, 846, (2018)].

[1]KAUST Office of Sponsored Research

Dale Pullin
California Institute of Technology

Date submitted: 31 Jul 2019 Electronic form version 1.4