Abstract Submitted
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Stability of expanding accretion shocks for an arbitrary equation of state[1] CSAR HUETE, Universidad Carlos III de Madrid, ALEXANDER L. VELIKOVICH, Naval Research Laboratory, DC, Plasma Physics, DANIEL MARTNEZ-RUIZ, Universidad Politcnica de Madrid — Stagnation of a cold material streaming to the center or axis of symmetry via an expanding accretion shock wave is a phenomenon of paramount importance in high-energy-density physics. The examples range from plasma flows in x-ray-generating Z pinches, impact ignition in ICF and Astrophysics, where stellar collapse may result in the formation of a high-density compressed core and a shock that propagates outwards through the infalling matter. We present a theoretical analysis for the case of stagnation that does not involve a rarefaction wave behind the expanding shock front. The dispersion equation that determines the eigenvalues of the problem and the explicit formulas for the eigenfunction profiles corresponding to these eigenvalues are presented for an arbitrary equations of state (EoS) and finite-strength shocks. The stagnated flow has been demonstrated to be stable for ideal gases and simple metals, with initial perturbations exhibiting a power-law, oscillatory or monotonic, decay with time for all the eigenmodes. Unstable behavior is found possible when certain conditions associated to the shape of the Rankine-Hugoniot curve are met, as those present in gases governed by van de Waals EoS, in resemblance to the D'yakov-Kontorovich instability of planar shocks.

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