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Analytical theory for the interaction of a planar shock wave with an isotropic 2D/3D isotropic density field[1] C. HUETE RUIZ DE LIRA, J.G. WOUCHUK, ETSII-INEI Univ. Castilla-La Mancha, Ciudad Real, 13071, Spain, A.L. VELIKOVICH, Plasma Physics Division, Naval Research Laboratory, Washington, DC 20375, USA — The response of a shock front to different kinds of perturbations in the fluid upstream is of paramount importance to several fields, in particular to ICF. We present here an analytical linear model that describes the interaction of a shock front with a random pre-shock density perturbation field. Exact expressions for the velocity, density, vorticity and pressure of the compressed fluid particles are obtained. For isotropic pre-shock conditions, the mode averaging can be easily implemented in 2D/3D. Fully closed analytical expressions for the kinetic energy, vorticity generation, density non-uniformity amplification and for the intensity of sound emitted downstream are shown in the whole range of gas compressibilities and shock intensities. A comparison to an existing model [J. G. Wouchuk *et al.*, Phys. Rev. E. **79**, 066315 (2009)] that describes the shock interaction with a turbulent vorticity field is also given.

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