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Analytical expressions for the asymptotic velocities in the linear Richtmyer-Meshkov instability when a shock is reflected. FRANCISCO COBOS, JUAN GUSTAVO WOUCHUK, E.T.S.I.Industriales-INEI-Cytema-Universidad de Castilla la Mancha-Ciudad Real-Spain — When a planar shock hits a corrugated contact surface between two fluids, hydrodynamic perturbations are generated in both fluids that result in asymptotic normal and tangential velocity perturbations in the linear stage. In this work, explicit and exact analytical expansions of the asymptotic velocities are presented for the general case in which a shock is reflected back. The expansions are derived from the conservation equations and takes into account the whole perturbation history between the transmitted and reflected fronts. The important physical limits of weak and strong shocks, high density ratio at the contact surface and very compressible/incompressible are studied. The expansions are compared with the exact solution obtained by iteration from a coupled set of functional equations and the limits of validity of those expansions are discussed. An approximate expression for the normal velocity, valid even for strong shocks in some regimes, is given. This work is a continuation of the calculations shown in Phys. Rev. E **90**, 053007 (2014) for a single shock moving into one fluid.

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