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Linear Theory for the Interaction of Small-Scale Turbulence with Overdriven Detonations CESAR HUETE RUIZ DE LIRA, ANTONIO L. SANCHEZ, FORMAN A. WILLIAMS, Univ of California - San Diego — To complement our previous analysis of interactions of large-scale turbulence with strong detonations, the corresponding theory of interactions of small-scale turbulence is presented here. Focusing most directly on the results of greatest interest, the ultimate long-time effects of high-frequency vortical and entropic disturbances on the burnt-gas flow, a normal-mode analysis is selected. The interaction of the planar detonation with a monochromatic pattern of perturbations is addressed first, and then a Fourier superposition for two-dimensional and three-dimensional isotropic turbulent fields is employed to provide integral formulae for the amplification of the kinetic energy, enstrophy, and density fluctuations. Effects of the propagation Mach number and of the chemical heat release and the chemical reaction rate are identified, as well as the similarities and differences from the previous result for the thin-detonation (fast-reaction) limit.

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