Analytic Approach to the Stability of Standing Accretion Shocks

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We explore an analytic model of the accretion shock in the postbounce phase of a core-collapse supernova explosion. We find growing oscillations of the shock in the $l = 1$ and 2 modes, in agreement with a variety of existing numerical simulations. For modest values of the ratio of the outer accretion shock to that of the inner boundary to the shocked flow, the instability appears to derive from the growth of trapped sound waves, whereas at higher values, postshock advection clearly plays a role. Thus, the model described here may relate to the different mechanisms of instability recently advocated by Blondin & Mezzacappa and by Foglizzo and collaborators.