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Modeling the Richtmyer-Meshkov Instability through Baroclinic Vorticity Production CHRISTOPHER WEBER, RICCARDO BONAZZA, University of Wisconsin-Madison, ANDREW COOK, Lawrence Livermore National Laboratory — The Richtmyer-Meshkov instability (RMI) is modeled using the baroclinic term in the vorticity transport equation and the results are compared to numerical simulations. The baroclinic vorticity production equation, $d\omega/dt = (\nabla\rho \times \nabla p)/\rho^2$, is simplified using an impulsive hydrostatic pressure gradient. Using this approximation, one can calculate the vorticity field from an initial density field and the post-shock 1D velocity. An analytic equation for circulation and perturbation growth rate is found for a single mode interface which proves accurate up to moderate Atwood numbers and Mach numbers. This model also accurately predicts the behavior of a more complicated interface with an arbitrary density field. The growth rate from the compressible RMI simulation and an incompressible simulation initiated with the same initial density field and the model's velocity field compare very favorably at low Mach numbers.

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