

Thu3.2

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Validating the FLASH code: Two- and three-dimensional simulations of shock-cylinder interaction

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We describe validation tests of the FLASH code for flows dominated by vorticity deposition and vortex dynamics. An experiment at Los Alamos National Laboratory is the reference for comparison. In the experiment, a column of sulfur hexafluoride is introduced into the test section of a shock tube, otherwise filled with air. A weak shock is generated and passes through the column. Baroclinic torques produce vorticity at the interface as the shock crosses it, leading to the formation of a vortex pair. The interface is distorted as the vortex pair rolls up, and secondary instabilities develop along the interface. The experiment is valuable for validating simulation codes in weakly compressible regimes driven by vorticity dynamics. Our validation tests focus on two-dimensional simulations, but three-dimensional effects are also examined.