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Non-classical behavior in shock-compressed gas mixtures[1]
PATRICK WAYNE, PETER VOROBIEFF, CAROLINA SHAHEEN, DANIEL FREELONG, C. RANDALL TRUMAN, University of New Mexico — Rankine-Hugoniot (R-H) equations, while assuming a calorically perfect gas, provide a good approximation for real gases undergoing shock compression. Our experiments focus on problems that arise when an attempt to predict post-shock gas properties is made for a non-reacting mixture of two gases with highly disparate properties (hydrogen and sulfur hexafluoride). Although the range of Mach numbers we consider is quite modest(1.2 to 2.0), we observe major deviations from the behavior that classical models predict. The latter include R-H equations in combination with either Dalton's or Amagat's law to characterize the gas mixture. Moreover, we observe these deviations to persist on time scales much longer than those historically associated with non-equilibrium behavior due to shock front passage.

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