

Abstract Submitted  
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### Shock

**Hugoniot Equations of State for Binary Ideal (Toluene/Fluorobenzene) and Non-Ideal (Ethanol/water) Liquid Mixtures** PETER SCHULZE, NHAN DANG, CYNTHIA BOLME, KATHRYN BROWN, SHAWN MCGRANE, DAVID MOORE, Los Alamos National Laboratory, HERCULES TEAM — Laser shock Hugoniot data were obtained using ultrafast dynamic ellipsometry (UDE) for both non-ideal (ethanol/water solutions with mole percent  $\chi_{ethanol} = 0\%$ , 3.4%, 7.5%, 11%, 18%, 33%, 56%, 100%) and ideal liquid mixtures (toluene/fluorobenzene solutions with mole percent  $\chi_{toluene} = 0\%$ , 26.0%, 49.1%, 74.9%, 100%). The shock and particle velocities obtained from the UDE data were compared to the universal liquid Hugoniot (ULH) equation. It was found that the UDE data deviate below the ULH for water and trend upward with respect to the ULH with increasing ethanol fraction, finally deviating completely above the ULH for mixtures with mole fraction greater than or equal to 56%. However, the ethanol/water mixture UDE data do not monotonically transition from below the ULH to above the ULH across the concentration range, but instead show increased deviation between ethanol mole fraction 7% - 12%. In contrast, the UDE data from the ideal liquid mixture are well behaved and agree with the ULH prediction across the concentration range. The deviations of the non-ideal ethanol/water data from the ULH are attributed to complex hydrogen bonding networks in ethanol/water mixtures that alter the compressibility of the mixture.

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