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High precision Hugoniot measurements of D2 near maximum compression[1] JOHN BENAGE, MARCUS KNUDSON, MICHAEL DESJARLAIS, Sandia National Laboratories — The Hugoniot response of liquid deuterium has been widely studied due to its general importance and to the significant discrepancy in the inferred shock response obtained from early experiments. With improvements in dynamic compression platforms and experimental standards these results have converged and show general agreement with several equation of state (EOS) models, including quantum molecular dynamics (QMD) calculations within the Generalized Gradient Approximation (GGA). This approach to modeling the EOS has also proven quite successful for other materials and is rapidly becoming a standard approach. However, small differences remain among predictions obtained using different local and semi-local density functionals; these small differences show up in the deuterium Hugoniot at $\sim$ 30-40 GPa near the region of maximum compression. Here we present experimental results focusing on that region of the Hugoniot and take advantage of advancements in the platform and standards, resulting in data with significantly higher precision than that obtained in previous studies. These new data may prove to distinguish between the subtle differences predicted by the various density functionals. Results of these experiments will be presented along with comparison to various QMD calculations.

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