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Mass Dependence on Turbulence in a Laser-Induced Plasma[1] S.D. ROBERSON, J.A. JOHNSON III, Laboratory for Modern Fluid Physics, Florida A&M University, C. BARNETT, C. AKPOVO, Laser Remote Sensing Laboratory, Florida A&M University — Single pulse plasmas are created when a focused pulsed Nd-Yag laser is fired on various gas targets at various pressures inside of a sealed chamber. The optical emissions of selected atomic and singly ionized lines were recorded with the oscilloscope at a rate of 10 GS/s. Standard calculations of turbulent parameters such as the characteristic frequency, the spectral index, the chaotic dimension, and the turbulent fluctuation energy were performed for each spectrum. From these calculations, a critical turbulent energy is determined for each combination of pressure and composition of the target gases in the sealed chamber. The evolution of the turbulent parameters as well as evolution of the electron temperature is calculated for various pressures and compositions of the target gas in the chamber. The turbulent parameters of different species are compared in order to determine a mass dependence of these turbulent phenomena. These relationships are explored using a second-order phase transformation explanation of a transition to turbulence from a non-turbulent to a turbulent state.

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