Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Acoustic timescale characterization of asymmetric hot spot detonation initiation JONATHAN D. REGELE, MICHAEL D. KURTZ, Iowa State University — Hot spots and temperature gradients are often used to model detonation initiation processes. Traditionally the focus of the analysis is on the critical gradient conditions necessary to facilitate detonation formation. However, hot spots usually have a local maximum of some finite size at the center. In previous work, acoustic timescale analysis has been used to characterize the behavior of a one-dimensional hot spot where a linear temperature gradient is joined with a constant temperature plateau. In the present work, the effects of multiple dimensions are analyzed by considering hot spots whose plateau and gradient regions are modeled as circles and ellipses. Even with clear differences in behavior between one and two dimensions, the *a priori* prescribed hot spot acoustic timescale ratio is shown to characterize the 2-D gasdynamic response. In asymmetric hot spots, it is shown that the behavior along the semi-minor axis is similar to the one-dimensional model over a limited period of time.

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Date submitted: 30 Jul 2014 Electronic form version 1.4