Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Analog System of Detonations with Loss and Stability of the Analog System YUANXIANG SUN, State Key Laboratory of Explosion Science and Technology,Beijing Institute of TechnologyChina, CHENG WANG, State Key Laboratory of Explosion Science and Technology,Beijing Institute of Technology, GROUP OF COMPUTATIONA FLUID DYNAMICS TEAM — Analog system of detonation is a simplified model of the Euler system. Analog system removes unnecessary details of the Euler system and reduces mathematical difficulty Analog system with losses and reaction mechanism that applicable for condensed-phase detonation is studied to examine whether the analog system in this paper is valid Details are as follows: 1. The relationship of detonation velocity vs. loss parameter is analytically solved, and a minimal state-dependence of the reaction rate$n$ required for this relationship to exhibit a critical behavior (i.e., a turning point) is examined The results agree with the limits which derived from Euler system. 2. Normal-mode method is used to study the stability of the analog system. A radiation (closure) condition is derived and applied at the end of the reaction zone. An analysis is performed to investigate whether the ideal, steady-state detonation can keep stable to small perturbations 3. Because analog system with loss can be more unstable than the ideal one. An numerical simulation is used to examine the detonation stability near the loss limits. The results above show that the analog system is basically valid for condensed-phase detonation

Yuanxiang Sun
State Key Laboratory of Explosion Science and Technology,Beijing Institute of TechnologyChina

Date submitted: 03 Mar 2017 Electronic form version 1.4