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Numerical simulation of double front detonations in a non-ideal explosive with varying aluminum concentration WUHYUN KIM, MINCHEOL GWAK, JACK YOH, Seoul National University, SEOUL NATIONAL UNIVERSITY TEAM — The performance characteristics of aluminized HMX are considered by varying the aluminum (Al) concentration in a hybrid non-ideal detonation model. Two cardinal observations are reported: a decrease in detonation velocity with an increase in Al concentration and a double front detonation (DFD) feature when aerobic Al reaction occurs behind the front. While experimental studies have been reported on the effect of Al concentration on both gas-phase and solid-phase detonations, the numerical investigations were limited to only gas-phase detonation for the varying Al concentration. In the current study, a two-phase model is utilized for understanding the volumetric effects of Al concentration in the condensed phase detonations. A series of unconfined and confined rate sticks are considered for characterizing the performance of aluminized HMX with a maximum Al concentration of 50%. The simulated results are compared with the experimental data for 5%-25% concentrations, and the formation of DFD structure under varying Al concentration (0%-50%) in HMX is investigated.

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