

Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Physical Model of Low Velocity Detonation in Plasticized HMX. KONSTANTIN GREBENKIN, VNIITF, MICHAIL TARANIK, SVETLANA TSARENKOVA, ALEXANDER SHNITKO — Phenomenon of low velocity detonation (LVD) is known many years, but its physical mechanism has not been understood in details, yet. A physical model of LVD is presented in the given report. The main idea of the model is that LVD in dense plasticized explosives may take place only when due to the lateral unloading the pressure at the leading shock front is reduced as compared to that at normal detonation (ND). As a result, the chemical reaction rate and, hence, the energy released between the leading shock front and the sound surface must be lesser as compared to that at ND. But, from other side, this may be enough to sustain the stationary regime of the LVD propagation. The model has been implemented in 2-D hydrocode and verified by means of computer modeling of the experiments (Leuret e.a., 1998) where LVD was observed in plasticized HMX. The results of our calculations supports the suggestion that LVD wave in plasticized HMX is a complex of the leading shock wave having pressure near 1 GPa and the compression wave following the front. Stationary propagation of such structure is possible only when some specific combination of the energy release rate and the lateral unloading intensity takes place.

Dean Preston
LANL

Date submitted: 21 Feb 2007

Electronic form version 1.4