

Abstract Submitted
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The Microstructure Characteristics of RDX and their Effect on the Detonation Velocity VICTOR BELLITTO, MIKHAIL MELNIK, MARY SHERLOCK, JOSEPH CHANG, JOHN OCONNOR, JOSEPH MACKEY, NSWC-IHEODTD, NSWC-IHEODTD COLLABORATION — Numerous methods exist for the theoretical calculation of detonation parameters of explosives. However, thermodynamic-hydrodynamic based theoretical codes seldom take into account particle size as a basis for the computational analysis as they primarily focus on the equation of state of the detonation products, heat of formation and density of the explosive composition. This study utilized regression analysis to model the relationship between the microstructure characteristics and detonation velocity of a heterogeneous high-explosive composition containing RDX. The principal characteristics examined were the average particle size of RDX, impurity within the RDX particles, method of RDX manufacture, and compositional density. Statistical analysis demonstrated the relevancy of the microstructure influence on the detonation velocity of the developed experimental compositions of 73 wt. % solids and 27 wt. % polyurethane binder. The developed statistical model accurately predicts the detonation velocity of the heterogeneous composition used in our experiments. The model underscores the significance of the relationship between the average particle size and detonation velocity. The importance of using statistical models for selecting characteristics that result in optimum explosive performance are addressed.

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