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Eigenvalue Detonation of Combined Effects Aluminized Explosives CHRISTOS CAPELLOS, ERNEST BAKER, WENDY BALAS, STEVEN NICOLICH, ARDEC, LEONARD STIEL, Polytechnic University, N.Y, ARDEC TEAM, POLYTECHNIC UNIVERSITY COLLABORATION — This paper reports on the development of theory and performance for recently developed combined effects aluminized explosives. Traditional high energy explosives used for metal pushing incorporate high loading percentages of HMX or RDX, whereas blast explosives incorporate some percentage of aluminum. However, the high blast explosives produce increased blast energies, with reduced metal pushing capability due to late time aluminum reaction. Metal pushing capability refers to the early volume expansion work produced during the first few volume expansions associated with cylinder wall velocities and Gurney energies. Our Recently developed combined effects aluminized explosives (PAX-29C, PAX-30, PAX-42) are capable of achieving excellent metal pushing and high blast energies. Traditional Chapman-Jouguet detonation theory does not explain the observed detonation states achieved by these combined effects explosives. This work demonstrates, with the use of cylinder expansion data and thermochemical code calculations (JAGUAR and CHEETAH), that eigenvalue detonation theory explains the observed behavior.

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