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Optimum Performance of Explosives in a Quasistatic Detonation Cycle ERNEST BAKER, US Army ARDEC, LEONARD STIEL, NYU Polytechnic School of Engineering (Retired) — Analyses were conducted on the behavior of explosives in a quasistatic detonation cycle. This type of cycle has been proposed for the determination of the maximum work that can be performed by the explosive. The Jaguar thermochemical equilibrium program enabled the direct analyses of explosive performance at the various steps in the detonation cycle. In all cases the explosive is initially detonated to a point on the Hugoniot curve for the reaction products. The maximum work that can be obtained from the explosive is equal to the P-V work on the isentrope for expansion after detonation to atmosperic pressure, minus one-half the square of the particle velocity at the detonation point. This quantity is calculated form the internal energy of the explosive at the initial and final atmospheric temperatures. Cycle efficiencies (net work/ heat added) are also calculated with these procedures. For several explosives including TNT RDX, and aluminized compositions, maximum work effects. were established through the Jaguar calculations for Hugoniot points corresponding to C-J, overdriven, underdriven and constant volume detonations. As expected, detonation to the C-J point is found to result in the maximum net work in all cases.

Leonard Stiel
NYU Polytechnic School of Engineering (Retired)

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