

Abstract Submitted
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JAGUAR Procedures for Detonation Behavior of Silicon Containing Explosives LEONARD STIEL, Polytechnic University, ERNEST BAKER, CHRISTOS CAPELLOS, WILLIAM POULOS, JACK PINCAY, U.S. Army Ardec, Picatinny, NJ — Improved relationships for the thermodynamic properties of solid and liquid silicon and silicon oxide for use with JAGUAR thermochemical equation of state routines were developed in this study. Analyses of experimental melting temperature curves for silicon and silicon oxide indicated complex phase behavior and that improved coefficients were required for solid and liquid thermodynamic properties. Advanced optimization routines were utilized in conjunction with the experimental melting point data to establish volumetric coefficients for these substances. The new property libraries resulted in agreement with available experimental values, including Hugoniot data at elevated pressures. Detonation properties were calculated with JAGUAR using the revised property libraries for silicon containing explosives. Constants of the JWL equation of state were established for varying extent of silicon reaction. Supporting thermal heat transfer analyses were conducted for varying silicon particle sizes to establish characteristic times for melting and silicon reaction.

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