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An Ignition Model for Liquid-Solid Powder Hypergolic Reactions RAAFAT GUIRGUIS, VASANT JOSHI, Naval Surface Warfare Center, Indian Head, MD 20640 — The thermal explosion theory is reformulated to describe the ignition of pulverized/finely divided solid explosives throughout which a hypergolic liquid has been dispersed. Although hypergolic in nature, the reaction at the interface between the two phases can be extinguished if the surface to volume ratio is outside a critical regime, or if the hypergolic liquid is quickly depleted because the injected amount was inadequate. The limitations on the particle size and mass fraction of the hypergolic liquid for successful ignition are derived in terms of the ambient temperature and heat of reaction, as well as the parameters controlling the rate of reaction and heat conduction of the solid explosive.

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