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Modeling shock responses of plastic bonded explosives using material point method[1] HAILIN SHANG, FENG ZHAO, HUA FU, Institute of Fluid Physics, China Academy of Engineering Physics — Shock responses of plastic bonded explosives are modeled using material point method as implemented in the Uintah Computational Framework. The two-dimensional geometrical model was established based on the micrograph of PBX9501. Shock loading for this explosive was performed by a piston moving at a constant velocity. Simulation results indicate that under shock loading there forms some stress localizations on the grain boundary of HMX explosive. These stress localizations lead to some serious plastic deformation. Simultaneously, the plastic strain energy transforms to thermal energy, causing the temperature to rise rapidly and form some hot spots on grain boundary areas. There are also some micro cracks appear at early time of the shock loading. But after some time these cracks begin to close, forming a few hot spots. The influence of shock strength on the responses of explosive was also investigated by increasing the piston velocity. And the results show that with increasing shock strength, the distribution of plastic strain and temperature does not have significant change, but their values increase obviously. Namely, the higher the shock strength is, the higher the hot spot temperature will be.

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