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Development of a reactive burn model based upon an explicit visco-plastic pore collapse model ERIC BOUTON, CEA/DAM LE RIPAULT F-37260 Monts, France, ALEXANDRE LEFRANÇOIS, CEA/DAM GRAMAT F-46500 Gramat, France, ROBERT BELMAS, CEA/DAM LE RIPAULT F-37260 Monts, France — Our aim in this study is to develop a reactive burn model based upon a microscopic hot spot model to compute the initiation and shock to detonation of pressed TATB explosives. For the sake of simplicity, the hot spots are supposed to result from the viscoplastic collapse of spherical micro-voids inside the composition. Such a model has been incorporated in a lagrangian hydrodynamic code. In our calculations, 8 different pore diameters, ranging from 100 nm to 1.2 μm, have been taken into account and the porosity associated to each pore size has been deduced from the PBX-9502 void distribution derived from the SAXS. The last ingredient of our model is the burn rate that depends on two main variables. The first one is the shock pressure as proposed by the developers of the CREST model. The second one is the number of effective chemical reaction sites calculated by the microscopic model. Furthermore, the function of the reaction progress variable of the burn rate is similar to that in the SURF model proposed by Menikoff. Our burn rate has been calibrated by using pressure profile, material velocities wave forms obtained with embedded particle velocity gauges and run distance to detonation. The comparison between the numerical and experimental results is really good and sufficient to perform a wide variety of simulations including single, double shock waves and the desensitization phenomenon. In conclusion, future works are described.

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