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Oblique impact and friction of HMX and/or TATB-based PBXs
DIDIER PICART, ALEXANDRA JUNQUA-MOULLET, CEA DAM Le Ripault F-37360 Monts France — Transportation, handling, vibrations can lead to moderate compressive but dynamic loadings requiring the characterization of the safety of PBXs submitted to such scenarios. Knowing that ignition can occur at a lower critical height during a fall on an inclined surface than a normal impact, the attention is focused in this paper on the heating due to the friction between PBXs and surfaces. A lot of experiments have been made using free-falling samples in vertical drop configurations on inclined targets or pendulum (skid) drop configurations (Green et al. 1971; Randolph et al. 1976). Data obtained on our HMX and/or TATB-based plastic-bonded explosives using pendulum drop configurations will be detailed. Evaluation of the heating due to friction requires the determination of the tangential projectile/target relative displacement and the contact pressure. The pressure is related to the normal force during the impact and the evolving contact surface, the latter being evaluated using a series of normal impacts. The aim of our paper is to compare the experimental diameter of the contact zones to (i) the classical Hertz's theory of contacting elastic solids and (ii) a spring-mass description of the impact. Data and models are then used to evaluate the increase of the temperature at the projectile/target interface for our explosives. We highlight the experimental bias which has already been attributed to the grits used to mimic the roughness of the surfaces.

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