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**Size-effect of explosive sensitivity under low velocity impact**

DANZHU MA, PENGWAN CHEN, QIANG ZHOU, Beijing Institute of Technology — Low velocity impact may ignite the solid high explosives and cause undesired explosion incidents. The safety of high explosives under low velocity impact is one of the most important problems in handling, manufacture, storage, and transportation procedures. More and more evaluation tests have been developed for low velocity impact scenarios, including, but not limited to the drop hammer impact test, the Susan test, the Spigot test, and the Steven test, with a charge mass varying from tens of milligrams to several kilograms. The effects of specimen size on explosive sensitivity were found in our drop hammer impact test and Steven tests, including the threshold velocity/height and reaction violence. To further analyze the size effects on explosive sensitivity under low velocity impacts, we collected the impact sensitivity data of several PBX explosives in the drop hammer test, the Steven test, the Susan test and the Spigot test. The effective volume of explosive charge and the threshold specific mechanical energy were introduced to investigate the size-effect on the explosive ignition thresholds. The effective volumes of explosive charge in Steven test and Spigot test were obtained by numerical simulation, due to the localization of the impact. The threshold specific mechanical energy is closely related to the effective volume of explosive charge. The results show that, with the increase of effective volume, the specific mechanical energy needed for explosive ignition decreases and trends to reach a constant value. The mechanisms of size effects on explosive sensitivity are also discussed.

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