

Abstract Submitted
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Study on Dynamic Fracture and Mechanical Properties of a PBX Simulant by Using DIC and SHPB Method ZHONGBIN ZHOU, PENGWAN CHEN, FENGLI HUANG — The deformation and fracture of a polymer bonded explosive (PBX) simulant, a particulate composite, were studied in this work. A pre-cracked semi-circular bending (SCB) specimen was dynamically loaded by a split Hopkinson pressure bar (SHPB). The failure process of the specimen was recorded by using a high speed camera. Based on the recorded images corresponding to the loading steps, the displacement and strain fields were determined by using digital image correlation (DIC) method. The displacement vector fields indicate that the specimen fractures under tensile stress. The strain distribution in front of the preset crack can be used to predict the propagation of the crack initiated from the tip of the pre-crack. In addition, the dynamic fracture toughness of the SCB specimen was measured. The fracture toughness values are $1.45\text{MPa}\cdot\text{m}^{1/2}$, $1.52\text{MPa}\cdot\text{m}^{1/2}$ and $1.85\text{MPa}\cdot\text{m}^{1/2}$ corresponding to strain rates 380s^{-1} , 450s^{-1} and 625s^{-1} , respectively. The results indicate that the fracture toughness show strong strain rate dependence.

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