

Investigation of stress propagation behaviour of projectile under pyro shock loading

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ABSTRACT

Pyro-devices, used to generate projectile force for separation, cause shock or impact loading on separated objects. So structural integrity of the part must be verified. The effect of shock propagation on the structural behaviour was examined using ABAQUS explicit code. Shock loading applied during analysis was characterized based on both experimental and kinematic analysis result of the separating motion. In order to simulate the stress wave propagation along the mechanical joint between parts, specific interface between parts was modelled precisely. To take the plasticity of materials under high strain rate into account, Johnson-Cook constitutive model (JCM) was implemented in the analysis.

As results, structural deformation and stress wave propagation behaviour over the structure during the separation motion were obtained. Similarity between ground test and analysis result was shown in terms of the location and level of the stress contour. From the results that stress level of some location was above its yielding criteria and strain rate at that point was high enough, it was validated to implement JCM as a hardening constitutive model in the analysis.

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