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Foam filling effectiveness of conical aluminium tubes under dynamic axial and oblique loading

Abstract

This paper presents the behaviour of empty and foam-filled conical aluminium tubes under dynamic axial and oblique loading. The effect of foam filling on the energy absorption for variation in geometrical parameter and filler density was evaluated and discussed. This study employs a nonlinear finite element model which was validated against experiment data. The validated model was subsequently used to assess the beneficial of foam filling with respect to the variation of geometry and filler density. The identification of Critical Effective Point (CEP) with the approach taken in varying the semi apical angle and by keeping the bottom diameter constant are advantageous to enhance the Specific Energy Absorption (SEA) of foam-filled tube over that of empty tube. These approaches are however, apply to only particular combination of geometrical parameters and filler density thus highlights the importance of appropriate selection of these parameters in achieving efficient performance of energy absorber particularly under dynamic axial loading. The information established in this study will facilitate the future development of thin-walled tubes for impact applications.

Keywords; Energy absorption; Dynamic; Conical tube.