

Effects of the triggering of circular aluminum tubes on crashworthiness

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Axial crash of thin-walled circular aluminum tubes is investigated in this study. These kinds of tubes usually are used in automobile and train structures to absorb the impact energy. An explicit finite element method (FEM) is used to model and analyse the behaviour. Formulation of the energy absorption and the mean crash force in the range of variables is presented using design of experiments (DOE) and response surface method (RSM). Comparison with experimental tests has been accomplished in some results for validation. Also, comparison with the analytical aspect of this problem has been done. Mean crash force has been considered as a constraint as its value is directly related to the crash severity and occupant injury. The results show that the triggering causes a decrease in the maximum force level during crash.

Keywords: circular tube; axial impact; response surface method; design of experiments; energy absorption; triggering