عنوان مقاله:

Crashworthiness Study of an Innovative Helmet Liner Composed of an Auxetic Lattice Structure and PU Foam

محل انتشار:

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خلاصه مقاله:

Helmet liners are employed to prevent or reduce head injuries caused by impact loads. Liners minimize the collision damage by impact shock attenuation and absorbing the collision energy. In order to improve crashworthiness characteristics of helmet liner, in the present study, an innovative structure designed by a combination of Polyurethane (PU) foam and auxetic lattice structure is suggested to replace the conventional EPS foams usually employed in the liner section. The baseline liner section is divided into two main layers. In one layer, PU foam is used instead of EPS and in the second layer, an arrowhead pattern auxetic structure is used to improve energy absorbing capacity. By employing three kinds of PU foam with different densities and four ۳D printable materials for the lattice structure, ۶ combinations of the modified liner are presented. An explicit finite element method is employed to model the innovative helmet structure under impact loading and results are compared with the conventional case based on the trend of .acceleration, energy absorption, weight, and Head Injury Criteria (HIC) factor

کلمات کلیدی:

Helmet liner, Polyurethane foam, Auxetic structure, Low-velocity impact, LS-Dyna