

عنوان مقاله:

An experimental study on the effect of buckling initiators on energy absorption behavior of thin-walled steel cones

محل انتشار:

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نویسندگان:

M Shariati - Associate Professor, Department of Mechanical Engineering, Ferdowsi University of Mashhad, Mashhad, Iran

E Sanati - Student at Ferdowsi University of Mashhad, Mashhad, Iran

S Nazarian - Student at Ferdowsi University of Mashhad, Mashhad, Iran

S.A Shariati - Student at Ferdowsi University of Mashhad, Mashhad, Iran.

خلاصه مقاله:

Thin-walled structures are used widely in engineering and industry. High strength and stiffness, low cost, very high loading capability and high energy absorbing capability are some of their advantages. When a thin-walled structure is subjected to axial loading, it deforms consecutively under different mode shapes and acts as a very good energy absorber. Although, thin-walled structures have so many above mentioned advantages as energy absorbers, when they are subjected to axial loading, they usually have an intense initial peak force. This initial peak force is dangerous and may cause serious harm or injury to the structure or people. To reduce this initial peak load some proper methods are developed such as creation of grooves, dents, cut out or any imperfection on proper location of structure, using corrugated structures and etc. Although these methods reduce initial peak force, they reduce the stiffness of structures under the actual loading conditions. Therefore a thin-walled specimen that its energy absorbing capability does not reduce under actual working conditions is highly required. In this paper a special buckling initiator is used to reduce the initial peak force of thin-walled steel conical specimens under axial loading. The buckling initiators are steel strips that are attached horizontally at one end of specimens using brazing. The geometry of Initiators is similar to a simple strip or two strips that are installed over each other similar to a plus (+) pattern. The axial loading is applied by two steps. In the first step, load is applied to initiators and pull the strips towards another end of cone. Therefore edge of cone that is attached to strips, is deformed plastically and thus initial stiffness of cone is diminished and also peak force is reduced. In the second step, loading is applied by a thick steel plate to the end of the cone continuously. The experimental results show that by using the buckling initiator, the large progressive deformation is carried out under different shape modes and act as a very good energy absorber.

کلمات کلیدی:

Experimental Mechanics, Buckling Initiator, Energy absorption, Thin-walled structures

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