

عنوان مقاله:

FINITE ELEMENT PREDICTION OF DUCTILE FRACTURE IN AUTOMOTIVE PANEL FORMING: COMPARISON BETWEEN FLD AND LEMAITRE DAMAGE MODELS

محل انتشار:

دو فصلنامه تحقیقات کاربردی در مهندسی مکانیک، دوره 1، شماره 1 (سال: 1391)

تعداد صفحات اصل مقاله: 8

نویسندگان:

b Jamshidi - *Department of Mechanical Engineering, Isfahan University of Technology, Isfahan, ۸۴۱۵۶۸۳۱۱۱, Iran*

f Haji Aboutalebi - *Department of Mechanical Engineering, Islamic Azad University, Khomeini Shahr Branch, Isfahan, ۸۴۱۷۵۱۱۹, Iran*

m Farzin - *Department of Mechanical Engineering, Isfahan University of Technology, Isfahan, ۸۴۱۵۶۸۳۱۱۱, Iran*

خلاصه مقاله:

In sheet metal forming processes with complex strain paths, a part is subjected to large plastic deformation. This severe plastic deformation leads to high plastic strain localization zones and subsequent accumulation of those strains. Then internal and superficial micro-defects and in other words ductile damage is created. This damage causes quality problems such as fracture. Therefore, design engineers need to accurately estimate the damage initiation and its growth. In this paper, initiation and evolution of damage has been predicted using Lemaitre's damage and forming limit diagram (FLD) damage models for automotive panel forming, because of its nonlinear strain paths. Lemaitre's damage criterion has been implemented as a subroutine for an elastic-plastic material and plane stress and finite strain theories. Using this subroutine in explicit finite element code, damage initiation and evolution is predicted for the above mentioned process and the results obtained by FLD and Lemaitre models are compared. In this paper, FLD and Lemaitre damage models results show the fact that the damage localization zones are corresponding to the equivalent plastic strain distributions. Comparison of the FLD damage and Lemaitre damage results show that in an automotive panel forming process, both models predict initiation of cracks in the edges of a sheet. Hence, it is concluded that finite element method combined with continuum damage mechanics can be used as a reliable and rapid tool to predict damage evolution in sheet metal forming processes with nonlinear and complex strain paths such as automotive panel forming.

کلمات کلیدی:

Prediction of damage evolution, FLD damage, Lemaitre damage, Automotive panel forming, Nonlinear strain paths

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/255123>



