Accepted Manuscript

Analysis of ductile fracture by extended unified strength theory

Peng Wang, Shaoxing Qu

PII: S0749-6419(17)30476-X

DOI: 10.1016/j.ijplas.2018.02.011

Reference: INTPLA 2307

To appear in: *International Journal of Plasticity*

Received Date: 18 August 2017

Revised Date: 7 December 2017

Accepted Date: 15 February 2018

Please cite this article as: Wang, P., Qu, S., Analysis of ductile fracture by extended unified strength theory, *International Journal of Plasticity* (2018), doi: 10.1016/j.ijplas.2018.02.011.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Analysis of ductile fracture by extended unified strength theory

Peng Wang, Shaoxing Qu[*1]

State Key Laboratory of Fluid Power & Mechatronic System, Key Laboratory of Soft Machines and Smart Devices of Zhejiang Province, Department of Engineering Mechanics, Zhejiang University, Hangzhou 310027 China

Abstract

Ductile fracture initiation models for predicting cracks or cavities nucleation in crack-free metals are vital to meet the rising requirements of lightweight and safety for engineering applications. In order to improve accuracy of the ductile fracture initiation models such as the Extended Mohr-Coulomb (EMC) type model and calibrate them easily, the Extended Unified Strength Theory (EUST) is proposed which can investigate the effects of hydrostatic pressure, the Lode angle, the intermediate principal stress, the independent principal shear stresses, and the corresponding normal stresses acting on the same planes on ductile fracture. By using the plasticity model, the EUST is transformed from stress space to the space of equivalent strain to fracture $\bar{\varepsilon}_f$, the stress triaxiality η, and the normalized Lode angle parameter $\bar{\theta}$. The parameters of the EUST fracture locus related to uniaxial tensile strength, uniaxial compressive strength, and shear strength possess intuitive physical meanings. Many other fracture loci including the EMC fracture locus are special cases of the EUST and the relations of the parameters between the present model and the existed models are established. The test data on 2024-T351 aluminum

[1] * Corresponding author: squ@zju.edu.cn (S. Qu); Tel.: +86-571-87952024

Download English Version:

https://daneshyari.com/en/article/7174834

Download Persian Version:

https://daneshyari.com/article/7174834

Daneshyari.com