

Author's Accepted Manuscript

A Generalisation of the Hill's Quadratic Yield Function for Planar Plastic Anisotropy to Consider Loading Direction

R.P.R. Cardoso, O.B. Adetoro



PII: S0020-7403(17)30279-5

DOI: <http://dx.doi.org/10.1016/j.ijmecsci.2017.04.024>

Reference: MS3671

To appear in: *International Journal of Mechanical Sciences*

Received date: 31 January 2017

Revised date: 28 March 2017

Accepted date: 24 April 2017

Cite this article as: R.P.R. Cardoso and O.B. Adetoro, A Generalisation of the Hill's Quadratic Yield Function for Planar Plastic Anisotropy to Consider Loading Direction, *International Journal of Mechanical Sciences* <http://dx.doi.org/10.1016/j.ijmecsci.2017.04.024>

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 a review of the resulting galley proof before it is published in its final citable 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

A Generalisation of the Hill's Quadratic Yield Function for Planar Plastic Anisotropy to Consider Loading Direction

R.P.R. Cardoso^a, O.B. Adetoro^b

^a*Brunel University London, Uxbridge, UB8 3PH, London, UK*

^b*University of the West of England, BS16 1QY, Bristol, UK*

Abstract

In this work, a new generalised quadratic yield function for plane stress analysis that is able to describe the plastic anisotropy of metals and also the asymmetric behaviour in tension-compression typical of the Hexagonal Closed-Pack (HCP) materials, is developed. The new yield function has a quadratic form in the stress tensor and it simultaneously predicts the r-values and directional flow stresses, which is shown to agree very well with experimental results. It also accurately describes the biaxial symmetric stress state which is fundamental for the accurate modelling of aluminium alloys. The new quadratic yield function represents the non-symmetric biaxial stress state by performing a linear interpolation from pure uniaxial loading to a biaxial symmetric stress state. The main advantages of this new yield function is that it can be used for the modelling of metals with any crystallographic structure (BCC, FCC or HCP), it only has five anisotropic coefficients and also that it is a simple quadratic yield criterion that is able to accurately reproduce the plastic anisotropy of metals whilst using an associated flow rule.

Download English Version:

<https://daneshyari.com/en/article/5016156>

Download Persian Version:

<https://daneshyari.com/article/5016156>

[Daneshyari.com](https://daneshyari.com)