

# Accepted Manuscript

On a dislocation-based constitutive model and dynamic thermomechanical considerations

J.C. Nieto-Fuentes, D. Rittel, S. Osovski

PII: S0749-6419(18)30061-5

DOI: [10.1016/j.ijplas.2018.04.012](https://doi.org/10.1016/j.ijplas.2018.04.012)

Reference: INTPLA 2340

To appear in: *International Journal of Plasticity*

Received Date: 3 February 2018

Revised Date: 9 April 2018

Accepted Date: 12 April 2018

Please cite this article as: Nieto-Fuentes, J.C, Rittel, D., Osovski, S., On a dislocation-based constitutive model and dynamic thermomechanical considerations, *International Journal of Plasticity* (2018), doi: 10.1016/j.ijplas.2018.04.012.

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.



# ON A DISLOCATION-BASED CONSTITUTIVE MODEL AND DYNAMIC THERMOMECHANICAL CONSIDERATIONS

J. C. Nieto-Fuentes\*, D. Rittel and S. Osovski

*Faculty of Mechanical Engineering, Technion, 32000 Haifa, Israel*

## ABSTRACT

Dislocation-based constitutive models are widely used to predict the plastic behavior of metallic materials, in both quasi-static and dynamic conditions. In addition, if the ratio of (adiabatic) thermomechanical (plastic work to heat) conversion is known, the stress-strain-temperature relationship can be estimated. The main purpose of this study was to verify the applicability of a widely-used expression (where the strain energy of a plastically deformed material is proportional to the density of dislocations) to calculate the stored energy in the material, which can be used in parallel with the micromechanical model to estimate the temperature rise during dynamic plastic deformation. An experimental campaign, where Kolsky (split Hopkinson) pressure bar tests were combined with *in situ* infrared temperature measurements, was conducted on OFHC copper compression specimens. The analytical thermomechanical conversion was compared with the experimental one, revealing *a significant discrepancy between the two*. An empirical *ad hoc* factor was introduced in the analytical expression in order to describe adequately the thermomechanical response of the material under dynamic (impact) loading conditions.

\* Corresponding author at: Faculty of Mechanical Engineering, Technion, 32000 Haifa, Israel.

Tel: +972 58 658 1100

E-mail address: [juan-carlos@campus.technion.ac.il](mailto:juan-carlos@campus.technion.ac.il) (Juan Carlos Nieto Fuentes)

Download English Version:

<https://daneshyari.com/en/article/7174775>

Download Persian Version:

<https://daneshyari.com/article/7174775>

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