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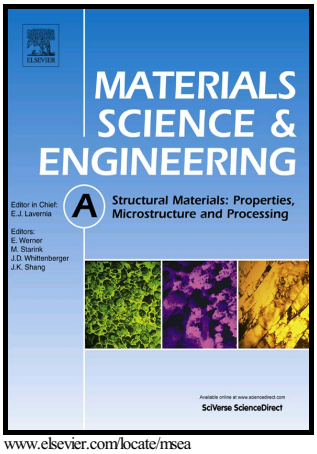

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PII: S0921-5093(16)30230-1
DOI: http://dx.doi.org/10.1016/j.msea.2016.03.028
Reference: MSA33423

To appear in: *Materials Science & Engineering A*

Received date: 14 January 2016
Revised date: 3 March 2016
Accepted date: 4 March 2016

Cite this article as: Wenchun Jiang, Shaohua Li, Yun Luo, Shugen Xu, Jianming Gong and Shan-Tung Tu, An analytical model to predict the equivalent creep strain rate of a lattice truss panel structure, *Materials Science & Engineering A* http://dx.doi.org/10.1016/j.msea.2016.03.028

An analytical model to predict the equivalent creep strain rate of a lattice truss panel structure

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Abstract

We developed an analytical model to predict the equivalent creep strain rate of a lattice truss panel structure. The model, which takes into account the effects of the bonded node and the intersection node of the trusses, is well validated by finite element analysis. Compared with Hodge and Dunand model, this model obtains a more accurate prediction result. The creep deformation of the panel structure is controlled by the creep of vertical trusses parallel to the applied load. The equivalent creep strain rate is determined by five key parameters including punching angle, cutting angle, truss thickness, width and length. A slight change of truss dimension can lead to a big variation of the creep rate by orders of magnitude. With the increase of punching angle and cutting angle, the relative density decreases and the stresses in the trusses increase, leading to an increase of creep rate. With the increase of truss thickness and width, the creep rate decreases because the relative density increases and the stresses in the truss decrease. As the truss length increases, the creep rate increases due to the decrease of relative density and the increase of stresses in the truss.