Ozturk, Tugce; Rollett, Anthony D.

Effect of microstructure on the elasto-viscoplastic deformation of dual phase titanium structures. (English) Zbl 1451.74041

Comput. Mech. 61, No. 1-2, 55-70 (2018).

Summary: The present study is devoted to the creation of a process-structure-property database for dual phase titanium alloys, through a synthetic microstructure generation method and a mesh-free fast Fourier transform based micromechanical model that operates on a discretized image of the microstructure. A sensitivity analysis is performed as a precursor to determine the statistically representative volume element size for creating 3D synthetic microstructures based on additively manufactured Ti-6Al-4V characteristics, which are further modified to expand the database for features of interest, e.g., lath thickness. Sets of titanium hardening parameters are extracted from literature, and the relative effect of the chosen microstructural features is quantified through comparisons of average and local field distributions.

MSC:

74A60 Micromechanical theories
74M25 Micromechanics of solids

Keywords:

FFT based elasto-viscoplastic micromechanical model; synthetic microstructure generation; 3D materials science; dual phase titanium alloys; additive manufacturing

Software:

DREAM.3D

Full Text: DOI

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