SM13L_12141

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

On the Role of Inter-Granular Layers in Polycrystalline Ceramics

Tomasz Sadowski[(1)], **Stephen Hardy**[(2)], Eligiusz Postek[(2)]

(1) *Department of Solid Mechanics, Lublin University of Technology, Lublin, Poland*
(2) *School of Engineering, University of Wales Swansea Singleton Park, Swansea, UK*

Ceramic polycrystalline materials have a non-linear and complex response to applied loads due to their internal structure. The inter-granular layers significantly change the macro-response of the material. The aim of the paper is to present a new constitutive model for the case of uniaxial tension of the polycrystalline materials, including the inter-granular metallic layers that create its internal structure. The quasi-static deformation process of a material comprises of: – elastic deformation of brittle grains, – elasto-plastic deformation of intergranular layers, – additional deformation due to micro-porosity development in layers A Representative Volume Element (RVE) was analysed taking into consideration an initial internal structure of the material obtained from SME photographs. Owing to the high complexity of the internal structure of the composite material, the FEM technique was used to obtain macroscopic stress-strain correlations.

View the extended summary