SNP Meeting/IMA PI Conference
Multiscale Effects in Material Microstructures and Defects
University of Kentucky Lexington, KY Friday, September 26 – Sunday, September 28, 2003

TEXTURE AND PLASTICITY OF POLYCRYSTALS: A PROBABILISTIC APPROACH

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A new probabilistic micromechanical model is presented in this paper to get the overall elastoplastic properties of polycrystals. At the microlevel (i.e. for the single crystal) non-crystallographic directions are consirered for the geometry of slipping: a probability measure, prescribed as a constitutive ingredient for the crystallite, is introduced to discriminate the likelihood of the slip systems. The inelastic part of the stretching is assumed to be in a rate-dependent form. The time differentiation of the assumed constitutive equation, between the Kirchhoff stress and the linear part of the elastic stretch, leads to a natural corotational derivative for the stress itself. The orientational average of such a derivative with respect to the ODF (Orientation Distribution Function) yields the overall elastoplastic muduli tensor for the polycrystal.