

A Novel Approach to Quantitative Analysis of Local Plastic Deformation in Grained Structures

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Novel technique for identifying and quantification of local deformation phenomena in continuum model of grained solid structure is presented in this paper. We propose a method that combines deformation properties of structure with the changes of grains geometry deformed under the influence of local force. Experimental analyses of grains shapes subjected to a local force show a specific spatially oriented prolongation of grains in direction determined by applied force. However the volume of each grain is retained during the force application in case of plastic deformation. Character of individual grain prolongation depends on the initial shape of grain and direction of loading force. There is a definite relationship between the change in grain shape and nature of the driving deformation force. We contribute to the revealing of mentioned relationship because of we propose and analyse a method for quantification of the effect of grain shape modification on the basis of grain deformation.

Quantitative analysis of local deformation in grained structure can be realized in a perspective using mentioned method. Map of local deformation data in grained system can be constructed in this way and next the local deformation dynamics analysis can be performed. However precision of mentioned analysis must be proven by evaluating of its practical predictive performance in future.

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