SM13S_10555

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

Porous Anisotropic Composites under Microfractures

Lidiya Nazarenko

Institute of Hydromechanics of NAS of Ukraine, Kiev

The aim of the present paper is to study the behaviour of composite materials with ellipsoidal inclusions. It is supposed that the components have transversally isotropic of physical and mechanical properties It is assumed that the matrix is porous and the loading processes leads to accumulation of damage in it. Fractured microvolumes are modeled by a system of randomly distributed quasispherical pores. As basic relations are taken the porosity balance equation and relation described effective elastic moduli in the case of transversally isotropic components. Effective moduli of such material are determined by using stochastic equations of elasticity theory and the method of conditional moment functions. The fracture criterion is considered as the limit value of intensity of average shear stresses occurring in the undamaged part of the material. Moreover, it is assumed that the strength limit is the random function of coordinates. The distribution of the functions is given by power-exponential formula. Algorithm enabling to calculate nonlinear elastic characteristics of the considered composite was constructed on the basis of the combined iterative method. The results of numerical calculations are presented in the form figures which depict the dependence of macrostresses on macrodeformations was found for various factors such as porosity, volume concentration of fazes and parameters of material strength scatter.

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