
Application of intrinsic strains theory to definition of metals and alloys non-linear deformation

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The model of non-linear deformation for isotropic material is under consideration. The model was constructed on the basis of the intrinsic strains theory. The suggested model leads to violation of elastic volume modification hypothesis. Residual volume modification depends on the degree of plastic deformations and is in proportion to the first invariant of the strain tensor. Experimental and calculated data were compared for one-axial loading (tension and compression), uniform compression and two-axial tension. The case of material unloading after plastic preloading is considered. Expressions for residual internal stresses are obtained. Yield condition for reloading is obtained too. Yield surface expands and moves simultaneously in principal stress space along the line that is inclined equally to the axes. It is shown that the model is non-contradictory one and describes properly main effects caused by material loading over limit of elasticity as well as some specific properties of materials such as anisotropic hardening.

Keywords: *the model of non-linear deformation, residual volume modification, anisotropic hardening.*

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