Modeling of elastoplastic flows in homogeneous and porous materials during dynamic pressing in a conical matrix

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The paper presents a mathematical model of dynamic extrusion of materials. Extrusion of materials under high loads through a die of complex geometry makes it possible to obtain materials with new strength characteristics [1]. The presented model includes differential equations of continuum mechanics in the cylindrical axisymmetric case in Lagrangian coordinates, equations of state for extruded substances, Prandtl-Reuss plasticity model and a model of material hardening [2].The model takes into account the effects associated with the interaction of the sample and the matrix: friction, heating due to the work of friction forces. A computer simulation of the dynamic extrusion of homogeneous and porous samples of copper and aluminum through a conical die with different reduction ratios was carried out. The calculations were carried out using a software package developed by the authors. The complex is based on a semi-analytical numerical method for solving problems in continuum mechanics [3]. Configurations of samples in different phases of pressing, density fields, temperature fields and fields of yield stress after pressing are presented. The dependence of the hardening of the sample on the taper angle of the matrix has been investigated.
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