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Numerical Modeling of Contact Fracture of Elasto-Plastic Cracked Bodies

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One of actual problems of a fracture mechanics is a research of crack extension in elasto-plastic bodies under a local contact loading. In the present work the algorithm of numerical modeling of such processes is developed on the basis of a variational method of contact problems solution for elasto-plastic cracked finite bodies. Boundary conditions of unilateral contact were set on contact surfaces of bodies and crack faces at the presence of a Coulomb friction. Quasivariational inequalities for definition of velocities or increments of displacements were built. The finite element method is used for their discretization. Modifications of the successive overrelaxation method and the conjugate gradient method are developed for solution of the obtained finite-dimensional nonlinear programming problems. The numerical modeling and the analysis of crack extension in elasto-plastic finite bodies under contact compression are fulfilled. Calculations were carried out based on various theories of plasticity: the theory of small elasto-plastic deformations, the theory of plastic flow with isotropic, transmit and combined hardening. It is clarified, that both sliding mode crack and a opening mode crack can develop at contact compression in a body.

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