Primal-Dual Active Set Method for Solving Frictional Contact Problems

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Abstract: Frictional contact boundary conditions remain an important issue in the mathematical and numerical analysis of contact dynamics problems. Recently, Primal–Dual Active Set strategies (PDAS) have emerged as a promising method for solving that type of problems. The conditions of contact with Coulomb's friction can be formulated in the form of a fixed point problem related to a quasi-optimization one thanks to the semi-smooth Newton method. The main idea here is to find the correct subset $\mathcal{A}$ of unknowns that are in contact (active) opposed to those which are not in contact (inactive). For each case, the nonlinear boundary condition is replaced by a suitable linear one. Numerical experiments on both hyper-elastic problems and rigid granular materials are presented to show the efficiency of the proposed method.