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PRIMAL-DUAL ALGORITHM FOR QUASI-STATIC CONTACT PROBLEM WITH COULOMB'S FRICTION

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This paper presents a fast first-order method for solving the quasi-static contact problem with the Coulomb friction. It is known that this problem can be formulated as a second-order cone linear complementarity problem, for which regularized or semi-smooth Newton methods are widely used. As an alternative approach, this paper develops a method based on an accelerated primal-dual algorithm. The proposed method is easy to implement, as most of computation consists of additions and multiplications of vectors and matrices. Numerical experiments demonstrate that this method outperforms a regularized and smoothed Newton method for second-order cone complementarity problems.

A STRONGLY POLYNOMIAL TIME ALGORITHM FOR AN LP PROBLEM WITH A PRE-LEONTIEF COEFFICIENT MATRIX

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In 1991, Adler and Cosares proposed a strongly polynomial time algorithm for an LP problem with a pre-Leontief coefficient matrix and pointed out that the algorithm can be efficiently applied to a generalized transshipment problem. In their generalized transshipment problem, a given demand is satisfied at each vertex except for a distinguished one while we impose the demand condition on all the vertices. Their approach is as follows: By using Veinott's matrix partition theorem, they partitioned the coefficient matrix into four submatrices including a Leontief submatrix, and these partitioned matrices were utilized in their algorithm. We suggest that the theorem needs more refinement. In order to clarify the suggestion, we refined the theorem to a new one by incorporating trivialities/nontrivialities of the rows and columns of a matrix whose notions were introduced by Veinott. With the help of the refined theorem, we have developed a new strongly polynomial time flow-based algorithm for a broader class of problems including their problem. In the paper by Adler and Cosares, we cannot see any algorithm for finding how to divide the columns of the coefficient matrix into two sets when we partition the matrix. Given a coefficient matrix partitioned, our complexity is the same as theirs. Our main contribution is the following two: 1）The developed algorithm can also determine the feasibility of the generalized transshipment problem, and our complexity is much smaller than theirs; 2）We showed an efficient algorithm for partitioning the given coefficient matrix into such four submatrices by introducing the trivialities/nontrivialities explained above.

A NEW APPROACH TO COMPUTING THE TRANSIENT-STATE PROBABILITIES IN TIME-INHOMOGENEOUS MARKOV CHAINS

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This paper considers the computation of the transient-state probabilities in time-inhomogenous continuous-time Markov chains. We first introduce a new class of time-inhomogenous Markov chains, which is closely related to the phase-type

representation of non-negative probability distributions. We show that the introduced class of Markov chains covers a wide-class of time-inhomogeneous Markov chains. We then develop a computational method of the transient-state probabilities in Markov chains of this class, which is an extension of the uniformization method in time-homogeneous Markov chains. The developed computational method has a remarkable feature that the time-discretization of the generator is not necessary, as opposed to previously known methods in the literature.