数学与系统科学研究院

计算数学所定期学术报告

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报告题目：

Quadratic-Function Conic Programming: Models and Conic Approximation Methods*

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报告地点：　科技综合楼三层 **311**

计算数学所报告厅

Abstract:

Quadratic-function conic programming (QFCP)is also named as conic programming over the cone of nonnegative quadratic functions. It is an equivalent reformulation of many combinatorial optimization problems and the quadratically constrained quadratic programming (QCQP) problems. The copositive conic programming is a special case of it. In this talk, we first present the primal and dual models of QFCP which are linear conic programs. Then its relationships with QCQP and copostitive conic programming are stated. As general QCQP and combinatorial optimization problems are NP-hard, we finally provide the following three approximation schemes for QCQP based on the structure of QFCP from the view point of computable.

The first scheme is to add valid redundant constraints to the relaxation problem of QFCP. By relaxation of the quadratic-function cone to a computable cone, the relaxation problem of QFCP becomes a computable conic problem, which makes a gap between QFCP and its relaxation. Adding valid redundant constraints may shrink the gap. Checking rules for valid constraints are discussed for this issue.

When the feasible set of QCQP is bounded and closed, we can use ellipsoids to cover the feasible set. Due to the properties of QFCP, we formulate a series of computable conic programming problems with linear matrix inequivalent equations for QCQP. Then an approximation scheme for QCQP is got by choosing fine covering ellipsoids.

The second-order cones can be used to cover some unbounded sets. Further discussion on the second-order conic covering and approximation scheme is provided at last.

Keywords: **conic programming, quadratic-function cone, approximation algorithms.**

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