

数学与系统科学研究院

计算数学所学术报告

报告人: **Prof. Zhening Li**

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报告题目:

**Conjugate Symmetric Complex
Tensors: Decompositions and
Optimizations**

邀请人: 刘歆 副研究员

报告时间: 2019 年 7 月 26 日 (周五)

下午 17:00-18:00

报告地点: 科技综合楼三层

311 报告厅

Abstract:

Hermitian matrices have played an important role in matrix theory and complex quadratic optimization. The high-order generalization of Hermitian matrices, conjugate partial-symmetric (CPS) complex tensors, have shown growing interest recently in tensor theory and computation, particularly in many application-driven complex polynomial optimization problems. In this paper, we study CPS tensors with a focus on ranks, rank-one decompositions and approximations, as well as their applications. We prove constructively that any CPS tensor can be decomposed into a sum of rank-one CPS tensors, which provides an alternative definition of CPS tensors via linear combinations of rank-one CPS tensors. Three types of ranks for CPS tensors are defined and shown to be different in general. This leads to the invalidity of the conjugate version of Comon's conjecture. We then study rank-one approximations and matricizations of CPS tensors. By carefully unfolding CPS tensors to Hermitian matrices, rank-one equivalence can be preserved. This enables us to develop new convex optimization models and algorithms to compute best rank-one approximations of CPS tensors. Numerical experiments from data sets in radar wave form design, elasticity tensor, and quantum entanglement are performed to justify the capability of our methods.

欢迎大家参加！