

Nonlinear Optimization Group¹ Reports

Title:

Computational Models and Complexities of Tarski's Fixed Points

Speaker:

Prof. **Yinyu Ye**

(Stanford University, USA)

Time:

December 21, Wednesday, **15:00-16:00**

Venue:

Room **311**, Institute of Computational Mathematics and Scientific/Engineering Computing (ICMSEC), AMSS, CAS

Invited by:

Center for Optimization and Applications(COA), AMSS

Abstract:

We consider two models of computation for Tarski's order preserving function f related to fixed points in a complete lattice: the oracle function model and the polynomial function model. Tarski's fixed point theorem plays a crucial role in the study of supermodular games (or games with strategic complementarities) for economic analysis. In this work we develop a complete understanding under the oracle function model for finding a Tarski's fixed point as well as determining the uniqueness of Tarski's fixed point in both the lexicographic ordering and the componentwise ordering lattices. In particular, we present the first known polynomial time algorithm for finding a Tarski's fixed point of the componentwise ordering. Moreover, we present a polynomial-time reduction of an integer program to an order preserving mapping from a lattice L into itself. As a result of this reduction, we prove that, when f is given as a polynomial function, determining whether or not f has a unique fixed point is Co-NP hard.

Joint work with Chuangyin Dang and Qi Qi.

¹ Homepage: <http://lsec.cc.ac.cn/~optim/> , Coordinator: Zhenli SHENG