

数学与系统科学研究院

计算数学所学术报告

报告人: 李浙宁 博士

(上海大学)

报告题目:

**Probability, Polynomial, and
Optimization --- From Coin Tossing
to Approximation Algorithms**

邀请人: 刘歆 博士

报告时间: 2012 年 9 月 21 日 (周五)

上午 10:30~11:30

报告地点: 科技综合楼三层 311

计算数学所报告厅

Abstract:

Coin tossing is a naive, simple, but sometimes powerful method in statistics and the design of randomized algorithms. In a typical application, random sampling based on coin tossing can be applied to estimate an extreme value, say maximum, of a function f over a set $S \subset \mathbb{R}^n$. To do so, one may select a simpler (even finite) subset $S_0 \subset S$, randomly take some samples over S_0 for a number of times, and pick the best sample. The hope is to find a good approximate solution with reasonable chance. In this talk, we set out to present a number of scenarios for f , S and S_0 where certain probability bounds can be established, leading to a quality assurance of the procedure. For example, if f is d -th degree homogeneous polynomial in n variables and F is its corresponding super-symmetric tensor, and ξ_i ($1 \leq i \leq n$) are random variables taking 1 or -1 based on independent coin tossing, then $\Pr\left\{f(\xi_1, \xi_2, \dots, \xi_n) \geq c_1 n^{-\frac{d}{2}} \|F\|_1\right\} \geq c_2$, where $c_1, c_2 > 0$ are two universal constants. Several new inequalities concerning probabilities of the above nature are presented. Moreover, the bounds are tight in most cases. Applications of the results in optimization are discussed as well.

欢迎大家参加!