数学与系统科学研究院

计算数学所学术报告

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报告题目：

Direct search based on probabilistic descent

邀请人： 袁亚湘 院士

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计算数学所报告厅

<u>Abstract</u>：

Direct-search methods are a class of popular derivative-free algorithms based on polling directions. To ensure the global convergence, it is typical to assume that the polling directions of each step make a positive spanning set, and the cosine measures of the positive spanning sets have a positive lower bound throughout the iterations.

However, recent numerical results indicated that randomly generating the polling directions without imposing the positive spanning property can improve the performance of these methods, especially when the number of polling directions is considerably less than $n+1$. In this talk, we analyze direct-search algorithms when the polling directions are probabilistic descent, meaning that with a significant probability at least one of them is of descent type. We establish the almost-sure global convergence, inspired by an argument known for trust-region methods. Under reasonable assumptions, we show that the worst case complexity of traditional direct-search methods holds with overwhelming probability, which tends to 1 exponentially with the iterations going. We will present the usefulness of martingale theory and large deviation techniques in the analysis of probabilistic algorithms.

This is a joint work with Clément W. Royer, Serge Gratton, and Luis Nunes Vicente.

欢迎大家参加！