

数学与系统科学研究院
计算数学所网络学术报告

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报告题目:

**Trust region and line search methods
based on inaccurate gradients:
theoretical results and numerical
experiences**

邀请人: 刘歆 研究员

报告时间: 2020 年 11 月 20 日 (周五)

上午 10:10-10:45

报告工具: 腾讯会议 (ID: 521 3538 2330)

会议密码: 311311

Abstract:

The exploration of inaccurate information in optimization is becoming indispensable for tackling some recent challenges arising from machine learning and artificial intelligence. This urges us to renew the theory of some classical optimization methods. We discuss the behavior of trust region and line search methods assuming the objective function is smooth yet the gradient information available is inaccurate. We provide sharp bounds on the (relative) gradient inaccuracy that can ensure the global convergence of the methods. When these bounds are respected the worst-case complexity of these methods remains essentially the same as when the gradients are accurate, which is the case even if the gradients have only one correct significant digit. On the other hand, once the gradient inaccuracy exceeds such bounds, the behavior of these methods deteriorates dramatically, which is demonstrated by our numerical experiments. As an interesting application of our theory, we will demonstrate that the trust region algorithms built in Octave (an open-source alternative to MATLAB; see <https://octave.org>) are unstable due to inappropriate implementation, and provide a simple remedy to stabilize them.

Bio:

Dr. Zaikun Zhang is an assistant professor at the Hong Kong Polytechnic University. He earned his PhD degree in 2012 from Chinese Academy of Sciences, and then worked at University of Coimbra and INP-ENSEEIH, University of Toulouse as a postdoctoral researcher. He joined the Hong Kong Polytechnic University in 2016. The research interests of Zaikun Zhang include derivative-free optimization, optimization based on inaccurate information, and the application of some successful strategies in numerical PDEs to nonlinear optimization.

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