深圳北理莫斯科大学
УНИВЕРСИТЕТ МГУ-ППИ В ШЭНЬЧЖЭНЕ
SHENZHEN MSU-BIT UNIVERSITY

应用数学讲座

Научный Семинар по Прикладной Математике

Research Seminar on Applied Mathematics

应用数学报告（67）

报告人 / Докладчик / Speaker: 金其年 教授（澳大利亚国立大学）

题目 / Название / Title: Mirror descent method and its stochastic version for solving inverse problems

时间 / Время / Time：18 Oct. 2022, 10:00-13:00

地点 / Место / Venue：腾讯会议：396-172-550
会议密码：777777

摘要 / Аннотация / Abstract:

Due to its simplicity of implementation and low complexity per iteration, Landweber method has been extensively studied for solving ill-posed inverse problems in Hilbert spaces and its convergence and rates of convergence are well-known. In order to adapt the method to the feature of the sought solution and the nature of the underlying problems, one needs to consider its extension for solving inverse problems in Banach spaces with a strong convex regularization term incorporated into the algorithm design. This leads to the mirror descent method which has been studied in optimization but not quite well-understood for inverse problems. Although its convergence property has been established in our early papers, how to derive the rates of convergence has been a challenging open question due to the appearance of non-Hilbertian structure of the underlying space and the non-quadratic feature of the regularization term. By interpreting the mirror descent method as a dual gradient method, recently we made progress toward deriving the convergence rates which I will address in the talk.

In many cases, the ill-posed inverse problems may be formulated as a system consisting of a number of equations. Solving such a problem of large size by the mirror descent method using the whole information at each iteration step can be very expensive, due to the huge amount of memory and excessive computational load per iteration. To solve such

large-scale ill-posed systems efficiently, recently we developed a stochastic mirror descent method which uses only a small portion of equations randomly selected at each iteration step. The method scales very well with the problem size and has the capability of capturing features of sought solutions. We will discuss the convergence property of the method if time permits.

金其年教授简介：

金其年，1997 年于复旦大学数学系获得博士学位， 然后进入南京大学数学系从事科研和教学工作，并于 2000 年晋升为副教授。后赴美国留学， 在 Rutgers 大学从事偏微分方程和几何分析的研究，并于 2006 年获得数学博士学位。之后分别在德州大学 Austin 分校和 Virginia Tech 从事博士后和访问学者工作。2011 年加入澳大利亚国立大学。2017 年获得澳大利亚基金委的 Future Fellowship （相当于中国的国家杰出青年基金）。 从事反问题，数值分析， 偏微分方程， 几何分析方面的研究。 在包括 Inverse Problems，Math. Comput.，Numer. Math，SIAM J. Numer. Anal. 等在内的国际期刊上发表论文 60 余篇。