Spectral Theory of Nonnegative Tensors

Qingzhi YANG¹, Liping ZHANG², Tan ZHANG³, Guanglu ZHOU⁴

¹ School of Mathematical Sciences and LPMC, Nankai University, Tianjin 300071, China

² Department of Mathematical Sciences, Tsinghua University, Beijing 100084, China

³ Department of Mathematics and Statistics, Murray State University, Murray,
KY 42071-0009, USA

⁴ Department of Mathematics and Statistics, Curtin University, Perth, Australia

© Higher Education Press and Springer-Verlag Berlin Heidelberg 2012

Higher-order tensors are natural extensions of matrices; matrices are order-2 tensors. However, higher-order tensors represent multilinear maps, which are nonlinear, unlike matrices. The spectral theory of matrices plays a fundamental role in many branches of mathematics as well as a multitude of applied sciences. In contrast to the well robust theory of matrices, the development of the spectral theory for tensors is still at its early stages. In recent years, with the rapid flow of massive data in this digital world, the demand for effective and efficient data-processing and data-managing algorithms finds its way in connection with the spectral theory of tensors. In particular, such key concepts as rank and eigenvalues-eigenvectors of a given tensor are getting more intriguing and challenging to researchers today.

In this special issue, we have presented a few selected topics by various groups of researchers currently investigating different aspects of the spectral theory of nonnegative tensors worldwide. The papers included in this special issue were invited or submitted, but have undergone a rigorous peer-review. We would like to extend our sincere thanks to the contributors and the referees.

Received December 26, 2012

E-mail: qz-yang@nankai.edu.cn, lzhang@math.tsinghua.edu.cn,
tzhang@murraystate.edu, G.Zhou@curtin.edu.au