Editorial

Recent Advances in Inequalities and p -Harmonic Equations

Shusen Ding,¹ Peilin Shi,² and Yuming Xing³

¹ Department of Mathematics, Seattle University, Seattle, WA 98122, USA

² Department of Epidemiology, Harvard University, Boston, MA 02115, USA

³ Department of Mathematics, Harbin Institute of Technology, Harbin 150001, China

Correspondence should be addressed to Shusen Ding; sding@seattleu.edu

Received 23 April 2014; Accepted 23 April 2014; Published 6 May 2014

Copyright © 2014 Shusen Ding et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

This special issue of the Journal of Function Spaces and Applications was originally proposed to highlight recent advances in the fields of inequalities and p -harmonic equations, to stimulate further investigation on these topics, and also to provide readers with an updated reference resource.

Inequalities have been very important tools in some fields of mathematics, including partial differential equations, analysis, and potential theory. Many important inequalities have been established in different areas of mathematics and related fields. The papers appearing in this special issue well reflect the recent development in these areas. For example, in a survey paper, the authors present an up-to-date account of the recent advances made in the study of Poincaré inequalities for differential forms and related operators. Specifically, various versions of Poincaré inequalities with different weights, including local and global inequalities in L^p norms and L^p norms, are discussed. As applications of Poincaré inequalities, the imbedding inequalities for differential forms and Green's operator are also presented. In another paper appearing in this special issue, the Lipschitz and BMO norm inequalities for the composition of the Hardy-Littlewood maximal operator and potential operator applied to differential forms are successfully established. As applications, authors obtain the norm inequalities for the Jacobian subdeterminants and the solutions of the quasilinear elliptic equation. In one of the papers, the properties of homeomorphism between the space of monotone variational inequalities problems and the graph of their solution mappings are obtained. Also, the existence of multiple solutions for the elliptic problem for partial differential equations is studied in a paper appearing

in this issue. The guest editors are very happy to see a good variety of the special issue papers which has greatly enriched this special issue. For example, in one of the special issue papers, the authors propose a new fuzzy game model by the concave integral by assigning subjective expected values to random variables in the interval. The explicit formulas of characteristic functions which are determined by coalition variables are discussed. Some notions and results from classical games are extended to the model. The nonempty fuzzy core is given in terms of the fuzzy convexity. In another paper, improved estimates for spectral norms of circulant matrices are investigated, and the entries are binomial coefficients combined with either Fibonacci numbers or Lucas numbers. This paper improves the inequalities for their spectral norms and gets corresponding identities of spectral norms. Moreover, by some well-known identities, the explicit identities for spectral norms are obtained. Some numerical tests are listed to verify the results.

In a paper, the robust stability for a class of stochastic systems with both state and control inputs is investigated. The problem of the robust stability is solved via static output feedback, and the authors convert the problem to a constrained convex optimization problem involving linear matrix inequality (LMI). The authors show how the proposed linear matrix inequality framework can be used to select a quadratic Lyapunov function.

We are confident that the creative ideas, the new results, and the efficient methods appearing in this special issue will stimulate further research in these areas and develop better conceptual understanding of mathematics and related areas.

Acknowledgments

Finally, we want to express our appreciation to the authors and reviewers for their time and effort spent on this special issue.

Shusen Ding
Peilin Shi
Yuming Xing