Editorial

Stability and Bifurcation Analysis of Differential Equations and Its Applications

Yongli Song,¹ Junling Ma,² Yonghui Xia,³ Sanling Yuan,⁴ and Tonghua Zhang⁵

¹*Department of Mathematics, Tongji University, Shanghai 200092, China*

²*Department of Mathematics and Statistics, University of Victoria, Victoria, BC, Canada V8W 3R4*

³*Department of Mathematics, Zhejiang Normal University, Jinhua 321004, China*

⁴*College of Sciences, University of Shanghai for Science and Technology, Shanghai 20093, China*

⁵*Department of Mathematics, Swinburne University of Technology, Melbourne, VIC 3122, Australia*

Correspondence should be addressed to Yongli Song; 05143@tongji.edu.cn

Received 9 December 2014; Accepted 9 December 2014

Copyright © 2015 Yongli Song 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.

Starting from Poincaré's qualitative theory and Lyapunov's stability theory of a dynamical system, stability and bifurcation theory has undergone a prodigious development. Stability and bifurcation theory of differential equations is relatively a mature research area, yet it has seen rapid developments in recent years. These advances have led to broad applications in many fields, such as physics, engineering, biology, neuroscience, economics, and even life and social sciences.

It is well known that delay is typically a primary source of oscillatory behaviour in delay differential equations and diffusion often causes Turing instability and becomes a primary source of spatial dynamics in reaction-diffusion equations. Therefore, we have targeted these topics in this special issue. The special issue received tremendous response from the researchers in this research field. So far, we have received 124 papers, which contribute to the research field with the infusion of new ideas and methods. All papers submitted to this special issue went through a rigorous peer-review process. Based on the reviewers' reports, we have carefully selected 48 original research papers for publication, which contain the delay-induced instability, stability switches, and Hopf bifurcations in delay differential equations; nonlinear instability, bifurcations, and blow-up solutions and travelling wave solutions in the reaction-diffusion equations; and almost periodic solutions in the stochastic differential equations.

It is impossible to collect all recently important advances in the field of bifurcation theory of differential equations by

a single special issue. But we believe that the papers to be published in this special issue can at least partially reflect some new advances and ideas in the field and do hope this special issue can influence the research field of bifurcation theory of differential equations in future.

Acknowledgments

The guest editors of this special issue would like to take this opportunity to thank all contributors for submitting their excellent work to this issue and all reviewers for their hard work and academic support to this special issue. They would also like to thank the editorial board members of this journal for their technical support and help during the whole period.

Yongli Song
Junling Ma
Yonghui Xia
Sanling Yuan
Tonghua Zhang