Methods and Applications of Analysis.
Vol. 28, No. 2, pp. iii–iv, June 2021

PREFACE

This special issue of Methods and Applications of Analysis is dedicated to Professor Ling Hsiao on the occasion of her eightieth birthday. As her students, friends and collaborators, we are all extremely happy to take this special occasion to celebrate Professor Hsiao's longtime impressive achievements in both mathematical researches and education.

Professor Ling Hsiao has been a long time leading mathematician with important contributions to many areas of nonlinear partial differential equations, which include (but not limited to): systems of quasilinear hyperbolic conservation laws, quasi-linear partial differential equations with dissipations, reaction diffusion equations, nonlinear partial differential equations arising from semiconductor science and plasma, and Boltzmann type equations in kinetic theory, etc. In particular, Professor Hsiao has had last impacts on the studies of the entropy conditions on discontinuous solutions to systems of conservation laws which include the famous result that the entropy rate admission condition and viscous criterion are equivalent if and only if the adiabatic constant is not less than 5/3 for the system of gas dynamics, the entropy conditions for non-convex hyperbolic conservation laws, and some generalized entropy conditions for systems of mixed type. Professor Hsiao was among the first to elucidate the role of the higher order dissipations such as the viscosity and heat conductivity to the smoothness of solutions for the nonlinear thermo-viscoelasticity. She also first justified rigorously the nonlinear diffusive phenomena for the compressible Euler equations with functional damping via the celebrated Darcy's law for both smooth and weak solutions. Her works on reaction-diffusion equations, such as internal layers, had been recognized widely. In her later researches, Professor Hsiao has also achieved some deep and important results on the topics of coupled systems of partial differential equations arising from semiconductor science and plasma, the Boltzmann equation and other kinetic equations.

Her accomplishments have had a strong influence on subsequent works in these fields and resulted in deeper theoretical understanding and applications. Besides her outstanding achievements in research, Professor Hsiao has been well known for her deep insight, vision, and generosity to students, post-doctors, colleagues, and young generations of mathematicians in the mathematical community. She has been open and generous, and she always makes extra effort to help young generations of mathematicians. In fact, many authors of this special issue are examples of those who have been benefited a lot academically from Professor Hsiao.

As Professor Hsiao's students and guest editors of this issue of MAA, we are grateful to all the authors who have contributed their high-quality research articles to this special issue in recognition of the great contributions made by Professor Hsiao. The topics of these articles cover analysis and numerics for both compressible and incompressible fluids and related PDEs, viscous radiative and reactive gas equations, scalar conservation laws, boundary layer equations, elastic-plastic flows, Vlasov-Poisson-Boltzmann equations, finitely degenerate coupled parabolic systems, Schrödinger equations, semilinear generalized Tricomi equation, degenerate and singular Monge-Ampére equations, and oscillatory integrals and applications. The analysis for these partial differential equations contains the well-posedness theory and studies on qualitative asymptotic behavior of solutions such as long time behavior, small

parameter limits, stability of wave patterns, finite time formation of singularities and etc.

On behalf of all the authors of this special issue, we would like to express our deepest gratitude to Professor Ling Hsiao, and wish her a happy birthday at this special occasion and many more healthy and productive years ahead.

Guest Editors:

Qiangchang JU (Institute of Applied Physics and Computational Mathematics, Beijing)
Hailiang LI (Capital Normal University, Beijing)
Tao LUO (City University of Hong Kong)
Zhouping XIN (The Chinese University of Hong Kong)