Preface

Special issue dedicated to Professor Chaojiang Xu's 65th Birthday (Part I)

We are delighted to present this special issue of the Communications in Mathematical Research in honor of Professor Chao-Jiang Xu on the occasion of his 65th birthday. Professor Chao-Jiang Xu's academic career in mathematics started at Wuhan University in China, where he received his B.Sc. degree in mathematics in 1981. And in 1986 he received his Ph.D. degree at Université Paris-Sud under the supervision of Professor Jean-Michel Bony. He served as a lecturer, associate professor, and full professor at Wuhan University until 1996, and after then he was a full professor at Rouen University in France where he retired and was appointed professor emeritus in 2020. He was a visiting researcher at Courant Institute (1990) and école Polytechnique (1991).

Professor Chao-Jiang Xu's main research is the microlocal analysis of partial differential equations. He has made outstanding contributions to the theory and applications of microlocal analysis in related research areas. He had developed

substantially Hörmander's linear subelliptic theory and established the nonlinear counterpart which is now a classical theory for nonlinear degenerate elliptic equations; his main current interests are concerned with the applications of microlocal analysis to kinetic theory and fluid mechanics, having been acknowledged internationally for his breakthrough works in the well-posedness theory of Boltzmann equations and Prandtl boundary layer equations. More precisely, he extended the classical hypoelliptic theory to the highly non-trivial nonlinear case which is widely applied in the diverse research areas, e.g., the subelliptic harmonic maps in differential geometry, the spectral problem of non-elliptic and non-selfadjoint operators, the well-posedness theory in degenerate fluid mechanics equations. With thirteen invited contribution papers from Professor Chao-Jiang Xu's close collaborators and colleagues, this special issue provides insight into recent developments and research directions in subelliptic theory, kinetic theory, and mathematical analysis of fluid mechanics, evidencing extensive applications of the nonlinear microlocal analysis in degenerate nonlinear partial differential equations from geometry and mathematical physics and perfectly characterizing his significant contributions in the topics addressed above.

Professor Chao-Jiang Xu is universally recognized as one of the active leading experts in nonlinear microlocal analysis. He received the National Science Fund for Distinguished Young Scholars in 1994, the Atyah Award of ICTP in Italy, and the National Award for Outstanding Contributions of Young Scholars.

Professor Chao-Jiang Xu pays special attention to the academic development of young researchers, and his dedication and passion in research leave tremendous influences on his students and postdocs, many of whom have embarked on successful academic careers. During his work at Wuhan University, he served as the director of the Institute of Mathematics and aimed to provide a strong academic environment for young researchers. He made significant contributions to the development of mathematics at Wuhan University and to the success of mathematics talents in China.

This special issue is vivid evidence of Professor Chao-Jiang Xu's tremendous influences on diverse research areas. We would like to thank all the contributors and referees for their invaluable and essential support to make this possible.

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