

Preface

Special Issue Dedicated to the Memory of Prof. Donggao Deng's 90th Birthday (Part II)



This special issue of Analysis in Theory and Applications (ATA) is dedicated to the memory of Professor Donggao Deng, the founding Associate Editor of ATA, on the occasion of his 90th birth anniversary.

Professor Donggao Deng was born on June 8, 1935, in Rongqi Town, Shunde City, Guangdong Province, China. He graduated from the Department of Mathematics at Peking University in 1957 and subsequently joined the faculty. Over the following three decades, he devoted himself to teaching and research at Peking University, where he was promoted to full professor in 1984 and doctoral advisor in 1985. During his tenure, he served in several leadership roles, including Party Branch Secretary of the Mathematics Department, Chair of the Department of Mathematics, and Deputy Director of the Beijing Mathematical Research Institute. After 34 years of service at Peking University, he joined Sun Yat-sen University in 1991, where he successively served as Chair of the Department of Mathematics and Dean of the School of Mathematics and Computational Science. At Sun Yat-sen University, Professor Deng played a pivotal role in strengthening the faculty by recruiting numerous

outstanding mathematicians from China and abroad, laying the groundwork for a new era of development in mathematics at the institution.

Professor Deng was a leading figure in the field of harmonic analysis in China and made many profound contributions to this area of mathematics. His journey in harmonic analysis began in 1956, while still an undergraduate at Peking University, under the guidance of Professor Minde Cheng. His first publication, derived from his bachelor's thesis titled "Approximation Properties of Linear Summation of Multiple Fourier Series", appeared in the *Journal of Peking University (Natural Science Edition)* in 1958. Over the course of his career, he published more than 50 research articles in prestigious domestic and international journals, authored three academic monographs, and contributed to seven other books including textbooks and translations. Among Professor Deng's most influential and representative works are:

- Resolution of the Kato Conjecture in Higher Dimensions under small L^∞ -norm assumptions on the coefficients. He established that the domain of the square root of a uniformly elliptic operator $L = \operatorname{div}\nabla A$ with bounded measurable coefficients on \mathbb{R}^n is the Sobolev space $H^1(\mathbb{R}^n)$, provided $\|A - I\|_\infty \leq \varepsilon(n)$. His seminal paper, "Domaine de la racine carrée de certains opérateurs différentiels accréatifs", was published in *Ann. Inst. Fourier (Grenoble)*, 33 (1983), pp. 123–134. This work was cited in the influential monograph "Ondelettes et Opérateurs" by R. Coifman and Y. Meyer and referenced extensively in subsequent research.
- A Generalized Carleson Inequality for Carleson Measures, which has become a foundational tool in the theory of tent spaces and has had wide-ranging applications in harmonic analysis.
- Translation and Introduction of Wavelet Theory in China. He translated and published R. Coifman's manuscript "Ondelettes et Opérateurs", which played a key role in bringing wavelet theory to Chinese mathematics. In collaboration with Professor Lizhong Peng, he published "Wavelet Analysis" in *Advances in Mathematics (China)* in 1991—the first paper on wavelet analysis published in China.
- Development of Littlewood–Paley Theory on Spaces of Homogeneous Type, culminating in the book "Harmonic Analysis on Spaces of Homogeneous Type" (Springer, 2009), co-authored with Yongsheng Han.
- Advancement of Function Space Theory, including Hardy and BMO spaces associated with differential operators on product domains.

Professor Deng was also a deeply committed mentor. Before his retirement, he supervised 21 Ph.D. students and over 30 Master's students—some in collaboration with Professor Minde Cheng—at Peking University and Sun Yat-sen University. Many of his students have gone on to distinguished academic careers. Among them is Professor Sijue Wu (University of Michigan, USA), who was elected to the American Academy of Arts and Sciences in 2022.

In recognition of his outstanding contributions to mathematics education, Professor Deng received numerous honors, including: First Prize of National Teaching (1993); The

Second Session Willing Ox Golden Globe Prize, Hong Kong Burlingame; Education Foundation (1996); Top Award for Outstanding Teachers, Baogang Education Foundation (2001); Teaching Famous Teacher Prize of the First State-Level Colleges and Universities (2003).

Professor Deng lived a life of quiet devotion to scholarship, untouched by the pursuit of fame or wealth. As we reflect on his remarkable academic legacy, we gain a deeper appreciation of his profound contributions—not only to mathematical education and scientific research in China but also to international academic exchange and the cultivation of generations of talent.

Professor Donggao Deng will be forever remembered with deep respect and admiration.

Special Issue Editors:

Ji Li, Macquarie University

Heping Liu, Peking University

Lizhong Peng, Peking University

Lixin Yan, Sun Yat-sen (Zhongshan) University