Achievements and Contributions in the Field of Partial Differential Equations: Special Issue Dedicated to Academician Zhou Yulin's Centenary Birthday

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Professor Zhou Yulin was born on February 12, 1923 in Shanghai and passed away on March 2, 2021 in Beijing. As a famous mathematician, he was the deputy director of the Institute of Applied Physics and Computational Mathematics, a member of the Science and Technology Committee of the Chinese Academy of Engineering Physics, and the chairman and honorary chairman of the Chinese Society of Computational Mathematics.

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Professor Zhou was one of the leading organizers and pioneers of early mathematical work in theoretical research of nuclear sciences. He had made truly extraordinary contributions to their developments in China. He was also one of the main founders in the field of nonlinear partial differential equations in China. He was awarded China's top science awards including the first prize in China's State Natural Science Award, the special award of the National Science and Technology Progress Award, Hua Luogeng Prize in Mathematics, the Prize for Scientific and Technological Progress by Ho Leung Ho Lee Foundation, and Su Buchin Special Award in Applied Mathematics. In 1991, he was elected as an academician of the Chinese Academy of Sciences.

In 1954, Professor Zhou was selected by the state to study in Moscow University. He resolutely gave up the topology research in which he had made progress, and changed his major to study nonlinear partial differential equations. In Moscow University, he was supervised by the famous mathematician O. A. Oleinik and conducted the research on the second boundary value problem of nonlinear parabolic equations. He applied skillfully the topological fixed point theorem to study the existence of global solutions. The well-known paper [1] on filtration equations (joint with his supervisor) is universally acknowledged as a classic pioneering work. As an important research achievement, it was included in the book *Forty Years of Soviet Mathematics, Partial Differential Equation* published in 1957, and has been constantly quoted from then on.

In 1957, Professor Zhou returned from Russia to work at the Department of Mathematics and Mechanics of Peking University. He initiated an advanced professional course on partial differential equations. At that time, nonlinear elliptic equations and parabolic equations were two of the most cutting-edge fields in the world, but they were completely new in China. Based on the latest understanding on nonlinear elliptic and parabolic equations, Zhou had cultivated a group of high-level teaching and research talents. The lecture notes, titled *Selected Lectures on the Theory of Nonlinear Elliptic Equations and Nonlinear Parabolic Equations* compiled by Zhou and his students, reflected the newest thought of nonlinear partial differential equations at that time, signifying that Chinese mathematicians had developed the study of nonlinear partial differential equations to a world-class level in 1959.

After the reform and opening up in 1978, Professor Zhou and his collaborators carried out a series of in-depth research on nonlinear evolution equations with important physical significance and obtained some innovative results with their original methods. For example, by using the Leray-Schauder fixed point theory and vanishing viscosity method for system of higher-order KdV equation, Benjamin-Ono equation, Landau-Lisfshitz equation, etc., he achieved the following internationally first-class theoretical results:

- He and his collaborators had demonstrated the existence and uniqueness of the global smooth solution to the Cauchy problem of the Benjamin-Ono equation [2], which was the first theoretical result in the world.