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ON THE OCCASION OF THE SEVENTIETH BIRTHDAY OF PROFESSOR CHANG KUNG-CHING

Professor Chang Kung-Ching

Professor Kung-Ching Chang (Zhang Gongqing) is an outstanding figure in contemporary Chinese mathematics. He made fundamental contributions to the study of PDEs with discontinuous nonlinearities and that of Harmonic Maps and Minimal Surfaces. He is a leading world expert in studying Infinite-dimensional Morse Theory. Born in the middle of messy wars, and educated at a time when China was going through traumatic modern transformations, Chang overcame unimaginable difficulties to achieve as not only a deep and influential mathematician, but also an admirable human being. He has spent a lifetime on his beloved field of mathematics and has

become a source of inspiration for several generations of Chinese mathematicians.

Chang was born on May 29, 1936, in Shanghai. Some of his family members were highly respected scholars and literati of the time, thus giving him an opportunity to develop an elegant style in his thought, his speech, his scholarship, and his general demeanor. Chang studied at Peking University (Beijing University) from 1954 to 1959. At the beginning, Chang was advised by Prof. Min-Teh Cheng (Cheng Minde) learning harmonic analysis. As an outstanding student, he participated a harmonic analysis seminar led by Cheng, and founded a reading group on Banach algebra together with his classmates. Later Chang's interest shifted to functional analysis, so Cheng recommended him to study with Prof. Chao-Chih Kuan (Guan Zhao Zhi), who was one of China's best experts of the area at that time. The period between late 50's and late 70's, however, was not an easy time for Chinese scholars, in particular, Chinese mathematicians. Under such a tough situation, Chang published his first paper "A proof of dispersion relations based on the theory of distributions" (Acta Math. Sinica, 1962). His professional career of mathematical research thrived from that point. However, there soon came the ten years of Cultural Revolution in 1966, and the situation became even worse. With extremely difficult conditions, he continued his study, research and applications of mathematics by all means. In 1975-76, he used his mathematical knowledge to help solve problems arising from experimental devices for plasmas and oil explorations, and found these problems can be modeled by PDEs with discontinuous nonlinearities. He was the first to solve such problems by fixed-point theorems for set-valued mappings and variational methods for non-differentiable functionals (CPAM, 1980; JMAA, 1981). The paper of 1981 is so far the most cited one (more than 110 times).

In the late 70's, released from the Cultural Revolution, Chang's mathematical career entered a new stage. Among the first group of Chinese scholars visiting the West after 1949, he went to the U.S.A. For 1979 and the spring of 1981, he was at Courant visiting L. Nirenberg. For 1980, P. Rabinowitz invited Chang to visit Wisconsin - Madison for a year. There he studied many frontier results of PDEs and began to pay attention to the critical point theory. Meanwhile his penetrating ideas on PDEs with discontinuous nonlinearities soon received broad and profound recognitions. Consequently he was invited to introduce his works at over twenty leading institutions in North America and Europe with high honors. At that time, the Conley index theory was not yet well understood. Chang's application of classical Morse theory to asymptotic nonlinear equations was groundbreaking. From then on and during the next decade, Chang systematically developed infinite dimensional Morse theory and its applications to multiple solutions of PDEs. Chang was the first person to introduce Morse theory into multiple solution PDE problems. By the time Chang returned to China in 1981, he was widely recognized as a well-established mathematician.