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Obituary of Professor Zhexian Wan

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Professor Zhexian WAN (WAN Che-hsien) passed away peacefully in Beijing on May 30, 2023 at the age of 95.

Professor Wan was born on November 7, 1927, in Shandong Province of China. In 1944, in the midst of World War II, Wan entered *National Southwestern Associated University* in Kunming, a transitory institute merged from three universities: *Peking, Tsinghua*, and *Nankai*. After the war, he graduated from *Tsinghua* University in 1948 and then taught at *Tsinghua* as a junior faculty member. In 1950, Professor Wan started working at the *Institute of Mathematics*, *Chinese Academy of Sciences (CAS)*. In 1984, he moved to the *Institute of Systems Science*, *CAS*, and had been there since then.

During his college years, Wan studied with many masters of the time, including Shiing-Shen Chern and Pao-lu Hsu. In particular, he attended several courses taught by Hsio-fu Tuan, thus laying down a solid foundation in algebra. In the 1950's, while working at the CAS as a young researcher, he began to study classical groups under the supervision of Loo-Keng Hua, the leader of domestic Chinese mathematics during the last century. This period was important in shaping his mathematical career.

Considered one of the major successors of Loo-Keng Hua, Professor Zhexian Wan made influential contributions in a wide array of areas, such as algebra, classical groups, coding theory, cryptology, finite fields, finite geometry, and combinatorics. As China went through traumatic transformations, he overcame unimaginable difficulties in developing his mathematics. Over the decades, he published over 150 research papers in various academic journals, in addition to 23 influential monographs.

In addition, Wan was regarded as one of the major founders of modern combinatorics and graph theory research in China. In 1958, he published a paper entitled "*A proof for a graphic method for solving the transportation problem*" at Shuxue Tongbao in Chinese. This is probably the earliest work on graph theory in China. In 1962, that paper was translated into English and appeared at Scientia Sinica. His book *Studies in Finite Geometry and the Construction of Incomplete Block Designs*, coauthored with Z. Dai, X. Feng and B. Yang

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and published by Science Press in 1966, has led many Chinese mathematicians to the fields of combinatorial research.

Due to his extraordinary achievements, in 1991, Professor Wan was elected to be a member of the *Chinese National Academy of Sciences*.

His significant works in later years included "Geometry of symmetric matrices and its applications I." (*Algebra Colloq*, 1994); "Geometry of symmetric matrices and its applications II." (*Algebra Colloq*, 1994); "Geometry of symmetric matrices and its applications III." (with J. Gao, R. Feng, and D. Wang, *Algebra Colloq*, 1996); "Geometry of matrices revisited" (*Algebras and Combinatorics, 1997*); ″Cyclic codes over Galois rings″ (*Algebra Colloq.*, 1999); "Multiset structures derived from vector spaces" (dedicated to the memory of Gian-Carlo Rota, *Ann. Comb.*, 2001); "Adjacency preserving mappings of symmetric and Hermitian matrices" (with W.-L. Huang and R. Höfer, *Aequationes Math*, 2004); and "Symplectic graphs and their automorphisms" (with Z. Tang, *European J. Combin*, 2006). His book *Geometry of Matrices*, published by World Scientific in 1996, is an essential classic for mathematicians working on the geometry of symmetric matrices and Hermitian matrices. Another book *Geometry of Classical Groups over Finite Fields*, published by Studentlitteratur and Chartwell-Bratt Ltd. in 1993, was so described: "The book is exceptionally lucid and is genuinely self-contained for those with a sound understanding of basic abstract algebra. It can be recommended as a primer suitable for beginning graduate students intending to work in finite geometries and also as a useful reference for those working in areas related to this field. The book may also be regarded as a stepping-stone to the monumental three volume work on Galois geometries recently completed by J. W. P. Hirschfeld and J. A. Thas." (by Vikram Jha).

Because of his far-reaching influence, Professor Wan was on the editorial board of several international journals in this field, for instance *Discrete Applied Mathematics*, *Annals of Combinatorics*, *Finite Fields and Their Applications, Algebra Colloquium*, and *Journal of Combinatorics Information and Systems Science*. Since the foundation of *Chinese Society of Combinatorics and Graph Theory (CSCGT)*, the official organization for all combinatorists and graph theorists in China, he had been its Honorary President. In addition, Professor Wan was the Chairman of the academic committee of the *Center for Combinatorics* (*CFC*, based at *Nankai University*), as well as that of the Center for Discrete Mathematics and Theoretical Computer Science (*DIMACS*, based at *Fuzhou University*).

Professor Wan supervised doctoral and masters' students, in both pure and applied mathematics, many of whom are now well-known mathematicians. To his students, he was a knowledgeable professor and a respectful teacher on one hand, while nonetheless a caring friend on the other hand. He spent a lifetime in his beloved field of mathematics and became a source of inspiration for several generations of Chinese mathematicians.

For the remarkable profundity of his mathematical discoveries — and of his educational contributions — Professor Wan will be sorely missed.