Introduction to Kang Feng

Mr. Kang Feng, Member of Chinese Academy of Sciences, Professor and Honorary Director of the Computing Center of the Chinese Academy of Sciences, famous mathematician and physicist, founder and pioneer of Chinese computational mathematics.

Professor Kang Feng was born in Nanjing on September 9, 1920. He was enrolled in the Department of Mathematics and Physics of Fujian Concord College in Spring 1939. In the same year, he was admitted to the Department of Electrical Engineering of the National Central University in Chongqin, two years later he transferred to the Department of Physics where he studied until his graduation in 1944. From 1945 to 1951, he worked as assistant lecturer at the Department of Physics of Fudan University, the Department of Physics and then the Department of Mathematics of Tsinghua University. In 1951 he was appointed as assistant professor at the newly established Institute of Mathematics of the Chinese Academy of Sciences. From 1951 to 1953 he worked at Steklov Mathematical Institute in Moscow, under the supervision of Professor L.S. Pontrjagin. In 1957 he was elected as an associate professor at the Institute of Computer Technology of the Chinese Academy of Sciences, where he began his work on computational mathematics and became the founder and leader of computational

mathematics and scientific computing in China. In 1978 he was appointed as the founding Director of the Computing Center of the Chinese Academy of Sciences until 1987 when he became the Honorary Director. He passed away on August 17, 1993, at the age of 73.

Professor Feng was elected as one of the National Outstanding Scientists in 1959, a member of the National People's Congress of China in 1964, and one of the National Model Workers in 1979. In 1980 he was elected as a Member of the Chinese Academy of Sciences. He was the vice president of Chinese Computer Society (1978--1986), president (1985--1990) and honorary president (1990--1993) of Chinese Society of Computational Mathematics, member of the Founding Council of International Association of Computational Mechanics (1982--1986), member of International Society for Interaction of Mechanics & Mathematics (1988--1993), member of the Scientific Advisory Board of International Center for Mathematical Sciences in Edinburgh (1991--1993). He was the chief editor of "Chinese Journal of Numerical Mathematics and Applications", "Journal of Computational Mathematics", "Mathematica Numerica Sinica" (in Chinese) and "Numerical Computations and Applications of Computer" (in Chinese). He was a member of Editorial Board of "Journal of Computational Physics" , "Computer Methods in Applied Mechanics and Engineering",

"Impact of Computing in Science and Engineering" , etc. He was one of the vice editors of Chinese Encyclopedia (Mathematics Section). He was the chief Scientist of China State Key Project for Basic Research: "Large-scale Scientific and Engineering Computing" (1991--1993), and the chairman of the Scientific Committee of the State Key Laboratory for Scientific and Engineering Computing (1992--1993).

Professor Feng's scientific contributions are outstanding and range over many fields. Before 1957 he mainly worked on pure mathematics, specially on topological groups, Lie groups and generalized function theory. From 1957 he changed to applied mathematics and computational mathematics. Because of his sound and broad knowledge in mathematics and physics, he did a series of historical and pioneer research on computational mathematics.

In the later 50s and early 60s of the last century, based on the computations of dam constructions, Professor Feng proposed a systematic numerical method for solving partial differential equations. The method was called ``Finite difference schemes based on variational principle''. This method was also independently invented in the west, is named as ``finite element method'' at the present. The finite element method has been widely used in scientific and engineering and the

invention of the finite element method is regarded as a milestone of the development of modern computational mathematics. In 70s of the last century, Professor Feng gave embedding theories in the discontinuous finite element space, and generalized the classical theory on elliptic equation to a various dimensional combination, which provided a mathematical foundation for elastic composite structures and was recognized as a pioneering contribution. At the same period of time, he made great efforts and contributions in reducing an elliptic equation to a boundary integral equation. He gave the natural boundary element method, which is now regarded as one of three main boundary element methods.

In 80s of the last century, Professor Feng changed his research field from elliptic equations to dynamics systems such as Hamiltonian systems and wave equations. In 1984, he proposed symplectic algorithms for Hamiltonian systems based on symplectic geometry. Such algorithms can preserve the symplectic geometric structure of Hamiltonian systems and have overwhelmingly superior to conventional algorithms in a long term tracking and qualitative simulation in many practice applications, such as celestial mechanics, molecular dynamics, etc. He is the pioneer of this field and has founded the new direction full of hope and prospects.

Due to his great scientific contributions, he was awarded many prizes, including the Second Grade of National Natural Science Award, the Second Prize of National Technology Advances, the First Grade of Natural Science Award of the Chinese Academy of Sciences, and the First Grade of National Natural Science Award. Professor Feng was invited to give 45 minute invited lectures in the International Congress of Mathematicians in1983 and 1994, and a plenary lecture in the International Congress on Industrial and Applied Mathematics in 1995.

Besides his scientific researches, Professor Feng served many administration duties. He spent much time to supervise students. Early in 60s of the last century, he lectured over 200 people on modern computational methods and supervised their researches. Now many of these people are leading computational mathematicians in China. Professor Feng made great efforts in educating young people. His students are now all over the world, and some of them are already very famous in the field.

Professor Feng paid much attention to the development of computational mathematics in China, he gave many important proposals. He wrote to the leaders of the Chinese government and suggested that scientific and engineering computing should be stressed as a key basic

research area in China. He organized and lead the national key project ``Large Scale Scientific and Engineering Computing'' , he set up the State Key Laboratory of Scientific and Engineering Computing. Professor Feng played an irreplaceable role in the development of scientific and engineering computing and made remarkable contributions in promoting applications of computational mathematics in China. He founded three journals of computational mathematics, "Mathematica Numerica Sinica" (in Chinese), "Numerical Computations and Applications of Computer"(in Chinese) , and "Journal of Computational Mathematics", which have made a great contribution to the academic exchange and talent education for computational mathematics community in China.

Professor Feng goes down in history, for his remarkable achievements and monumental contributions to Computational Mathematics.