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Dr. Novak Zuber In Memoriam

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Dr. Novak Zuber was a true pioneer in the field of two-phase flow and heat transfer beginning his illustrious engineering career with the development of a hydrodynamic theory for peak nucleate boiling and minimum film heat flux and his "drift flux" model. Dr. Zuber was a Montenegrin born in the Moskva Hotel in Belgrade, Yugoslavia, on December 4, 1922. Prior to his immigration to the United States, Novak was a member of the **Balkan Air Force** (BAF), an Allied air formation composed of units of the Royal Air Force and South African Air force under the Mediterranean Allied air Forces command. It was active from 7 June 1944 until 15 July 1945 under the command of RAF Air Vice Marshalls William Elliot and George Mills. This was followed by attending the University of Rome in Italy (1945-1947). During the period 1947-1949 he was a merchant seaman working as a wiper in the engine room of a ship captained by a family friend. Dr. Zuber's intense desire to pursue his scholastic dreams and an Uncle in the Los Angeles, CA area prompted him to jump ship during a stop in San Pedro, CA. He found his way to the University of California at Los Angeles and was able to enroll in their mechanical engineering program. In order to complete his education, he performed odd jobs such as washing dishes, washing cars, cleaning chicken coops and gardening. Basically, jobs that didn't require a "Green Card." Immigration finally caught up with Novak during grad school. However, by that time, he had impressed the people at UCLA with his work on high pressure boiling in support of the development of Rickover's nuclear submarine enough that they came to his rescue and he was able to complete his degree program, including the B.S., M.S., and Ph.D. His doctoral dissertation was the classical treatment of hydrodynamic aspects of boiling heat transfer.

Dr. Zuber's professional career began with a short period of time at Thompson Ramo-Woolridge (1958-1960) followed by his joining General Electric in Schenectady, NY in 1960 where he began his research work in the General Engineering Laboratory and Research and Development Center. It was at General Electric where he began his research on two-phase fluid flow phenomenon and began the development of his model of the now well known and widely used "Drift Flux" model for describing average volumetric concentrations in a two-phase flows systems. The importance of this model and its application to predicting the performance of nuclear power plants has been a major contribution to the field. From 1967 to 1974 he was a Professor of Mechanical Engineering at New York University and at the Georgia Institute of Technology where he supervised seven theses for M.Sc. degrees and six doctoral dissertations, many of which became significant contributions to the two-phase flow and heat transfer literature. The research he performed during the early years of his professional career has been a major contribution to the understanding of two-phase fluid flow phenomena. Specifically, the "Drift Flux" model for describing average volumetric concentrations in a two-phase flows systems has found many important applications in predicting the performance of nuclear power plants and other two-phase flow systems.

In 1974, Dr. Zuber began the second phase of his professional life by working with the US Nuclear Regulatory Commission (NRC) in the Office of Nuclear Regulatory Research. Until his retirement in 1991, he was responsible for reviewing and guiding the development of the NRCs computer codes as tools for assessing safety of nuclear reactor systems. This began with his chairing the Advanced Code Review Group, a

group composed of the leaders in the field, and culminated with his being responsible for developing and demonstrating the code scaling applicability and uncertainty (CSAU) methodology for LBLOCA, a beginning of the deterministic approach to accident analysis. He served as the US representative on the International Committee guiding the 2D/3D program, a major international program to resolve multidimensional effects during large break loss of coolant accidents (LBLOCAs). Just before his retirement in 1991, he was responsible for formulating a severe accident hierarchical scaling methodology that enabled resolution of what was thought to be a serious threat to public safety. In his retirement Zuber continued a high level of professional contribution as a consultant to the USNRC Advisory Committee on Reactor Safeguards and to the "Joseph Stefan" Institute in Slovenia.

Over the years Dr. Zuber made contributions to all aspects of two-phase flow and heat transfer, and many of his papers are landmark publications which have opened the way for subsequent contributions. Dr. Zuber's contributions to the field of two-phase flow and heat transfer garnered several honors and awards. He was the first recipient of ASME Heat Transfer Division's Memorial Award in 1961, the Technical Achievement Award from the Thermal Hydraulics Division of the ANS in 1990, and Meritorious Service Awards and a Special Achievement Certificate from the USNRC for outstanding contributions. He was presented a Medal of Honor from the Société Française de l'Energie Nucléaire for his lifetime achievements at NURETH 11 in 2005. Dr. Zuber was a fellow of the ASME, published over 50 technical papers and was a co-editor of several books.

Aside from Novak's professional accomplishments, he was a fascinating person with a keen mind and sense of responsibility to the technical community. His many talks were laced with admonitions to listening young engineers that they had a responsibility to do the right thing. His concern for the education of young engineers led to the establishment of the Cheyovich-Kerze Research Fellowship at UCLA. He had no patience for engineers that did not present their views in an honest and forthright manner. Many of us suffered his scorn when we came up short and were better for it. Novak Zuber tracked in a "straight line" and those of us who knew him well know what he meant when he used the phrase.

