Multiphase Science and Technology, 25 (2–4): 113–115 (2013)

NOVAK ZUBER AT GEORGIA INSTITUTE OF TECHNOLOGY (1969–1974)

Wolfgang Wulff

Nonproliferation and National Security Department, Brookhaven National Laboratory; Stony Brook University; P.O. Box 5000, Upton, NY 11973-5000; E-mail: wolfgangwulff@optonline.net

Novak Zuber moved from New York University to join the School of Mechanical Engineering (ME) at Georgia Institute of Technology (Georgia Tech) (Atlanta, Georgia) in 1969, about one year after me. Novak moved in next door to my office and we became close friends and collaborated on several programs. Georgia Tech attempted at that time to improve ME by attracting accomplished faculty, mainly from the North and Midwest.

Novak's arrival quickly elevated the stature of ME because of his well-known pioneering contributions to heterogeneous fluid dynamics and his unsurpassed international recognition. He was the first to bring a research program with outside funding to the school, along with two Ph.D. candidates, Mamoru Ishii and Gunol Kocamustafaogullari, who became pioneering contributors to the field of multiphase flow. Novak mentored six Ph.D. and seven M.S. students at Georgia Tech. Novak arranged for guest scientists with great reputations from France. He invited Jean Bouré (1991) to Georgia Tech for a short visit and Jean-Marc Delhaye, who stayed at Georgia Tech for seven months working with Novak, Mamoru and Gunol. Novak and I drove to the Marshall Space Flight Center in Huntsville, Alabama, trying to attract a senior rocket designer to the School of Mechanical Engineering, but we were unsuccessful. Art Bergles joined the School of Mechanical Engineering.

Our first major cooperation was to write a proposal to the Commerce Department, i.e., the National Bureau of Standards, which sought to develop federal legislation on fire retardants for fabrics. This brought the fabric flammability, and later the burn injury, research programs to Georgia Tech under the auspices of the Research Applied to National Needs (RANN) Program, where government and industry cooperated and funded academia. From this, subsequent research programs on building and forest fires evolved.

However, Novak's research and his students' interest were mainly in phase change and two-phase flow stability. They built the first boiling loop at Georgia Tech and made major contributions to stability (Ishii), the onset of net vapor generation (Saha-Zuber) in boiling water reactors, and the basic concepts of wall shear in two-phase flow. The arrival of two plasma physicists, Uwe Bauder and Steve Devoto, and their test facility

0276–1459/13/$35.00

from Wright Patterson Air Force Base, made the School of Mechanical Engineering unique and the leading school with research funding from outside.

While the research laboratories and test facilities were improving and expanding, efforts by the new faculty to improve the severely neglected teaching laboratories and classrooms were met with painful indifference by the ME director, S. P. Kezios. The tension grew in general between the ME faculty and director. Professors with tenure and/or substantial outside funding found the courage to appeal for help, first to the dean of engineering, then the provost and vice president, and finally to the president of Georgia Tech. However, the administration decided to preserve their power hierarchy and sided with the director, who in turn retaliated against all those who had appealed for help to the dean. He dismissed two very accomplished but still untenured professors. At that time Novak and I decided that Georgia Tech was no longer the place for us to work.

Novak left Georgia Tech in the spring of 1974 to join the U.S. Nuclear Regulatory Commission (NRC) from where he impacted two-phase flow research and reactor safety analysis and experiments throughout the world. He left Georgia Tech leaving behind his last paycheck, which the director had withheld in retaliation. I stayed to finish the quarter and turned in the grades of my classes. Then, I left to join Brookhaven National Laboratory (BNL). Novak and I continued to work together. Novak was the monitor for some of BNL's programs. We consulted together on the NRC Advanced Code Review Committee and on the Subcommittee for Thermal Hydraulics of the Advisory Committee on Reactor Safeguards (ACRS). We worked on two technical program groups, one for the code scaling, applicability, and uncertainty (CSAU) evaluation methodology (Boyack et al., 1990) and the other for an integral structure and scaling methodology for severe accident technical issue resolution. Later, we published a sequence of three papers on fractional scaling together with Ivan Catton and Upendra Rohatgi (Catton et al. 2009; Wulff et al., 2009; Zuber et al., 2009).

Novak was to the nuclear industry what US Navy Admiral Hyman G. Rickover was to the nuclear navy. Novak had uncompromised integrity, and in all the years that I knew him he surprised me again and again with his vision, insight, and brilliant original ideas. He preferred heuristic over reductionist approaches and elegant simplicity over complexity. He produced realistic solutions to intractable problems. He was my good friend; my wife, Herta, and I have precious memories of Novak and his wife, Connie, in Atlanta, Ga.

REFERENCES

Bouré, J., *Multiphase Science and Technology*, G. F. Hewitt and J. M. Delhaye, Eds., Hemisphere Publishing Corporation, New York, Washington, Philadelphia, London, Vol. 9, Issue 1, Parts 2 and 3, 1991.

Boyack, B. E., Catton, I., Duffey, R. B., Griffith, P., Katsma, K. R., Lellouche, G. S., Levy, S., Rohatgi, U. S., Wilson, G. E., Wulff, W., and Zuber, N., Quantifying reactor safety margins

part 1: An overview of the code scaling, applicability, and uncertainty evaluation methodology, *Nuclear Eng. Design*, vol. **119**, no. 1, pp. 1–15, 1990.

Catton, I., Wulff, W., Zuber, N., and Rohatgi, U. S., Application of fractional scaling analysis to loss of coolant accidents: Component level scaling for peak clad temperature, *J. Fluids Eng.*, vol. **131**, no. 12, p. 121401, 2009.

Wulff, W., Zuber, N., Rohatgi, U. S., and Catton, I., Application of fractional scaling analysis to loss of coolant accidents, System level scaling for system depressurization, *J. Fluids Eng.*, vol. **131**, no. 8, p. 081402, 2009.

Zuber, N., Rohatgi, U. S., Wulff, W., and Catton, I., Application of fractional scaling analysis (FSA) to loss of coolant accidents (LOCA): Methodology development, *Nuclear Eng. Design*, vol. **237**, no. 1, pp. 1593–1607, 2009.