

Professor Dr.-Ing. Dieter Gorenflo, in celebration of his 70th birthday

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This selection of papers from the 6th International Conference on Boiling Heat Transfer is dedicated to Professor Dr.-Ing. Dieter Gorenflo, in celebration of his 70th birthday on 2 February 2007 and in recognition of his outstanding contributions to the science of boiling heat transfer and its application to refrigeration. These contributions throughout a long career have been marked previously by awards from the DKV (German Association of Refrigeration and Air Conditioning) in 1976 and from the International Institute of Refrigeration in 1991.

Dieter Gorenflo was born and educated in Karlsruhe. He obtained the degree of Diplomingenieur from Karlsruhe University in 1962 and the degree of Dr.-Ing. in 1996 for research on boiling heat transfer in the Institute of Thermodynamics and Refrigeration, which was founded by Prof. Rudolf Plank, one of the leaders in the development of refrigeration. In 1971, he was appointed as the Head of the Refrigeration Department in the Institute. He was elected as a member of the International Institute of Refrigeration in 1975. In 1979, he left Karlsruhe to take up the position of Professor in charge of Thermodynamics, Heat Transfer and Refrigeration at the University-GH Paderborn, where he later served as the Dean of the Faculty of Mechanical and Chemical Engineering. Under his leadership, the Institute Wärme-und Kältetechnik developed its reputation as a centre of excellence in boiling research and launched the careers of many talented graduate students. The Institute hosted two very successful Eurotherm Seminars on Pool Boiling in 1989 and 1996 and an IIR Conference on Thermophysical Properties and

Transfer Processes in 2001. Professor Gorenflo was the Secretary of the Eurotherm Committee 1993–1997. He has been prominent in promoting the professional application of research in heat transfer and refrigeration at a national level, in DKV and VDI/GVC (German Association of Mechanical and Chemical Engineers), and internationally first as a Vice-President and since 1999 as President of Commission B1 of the International Institute of Refrigeration, over a period when refrigeration has figured prominently in international deliberations on environmental impact and energy efficiency. Commission B1 is responsible for a remarkably wide range of activities, including thermophysical properties of refrigerants and mixtures, heat and mass transfer and two-phase flow, lubricants and insulants and cycle performance. Official retirement in 2002 and transfer to an Emeritus Professorship at Paderborn appeared to have little effect on his level of activity.

Dieter Gorenflo's research has had a breadth to match that of Commission B1, including challenging problems such as boiling of partially-immiscible mixtures and highly viscous liquids and boiling on enhanced surfaces, but the core activity has been the fundamental study of pool boiling on horizontal cylinders, with rigorous attention to experimental accuracy and reproducibility. The "standard pool boiling apparatus", which provided stable conditions around and within the boiling vessel should be studied by all graduate students as an object lesson in the high standard of engineering that can be achieved in experimental equipment. The same standard was applied to the construction of the test sections and the placing of sensors. Consequently, highly accurate and reproducible boiling data were obtained for a wide range of fluids and conditions, even at the very low wall superheats characteristic of near-critical pressures. This information was developed

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into a widely-used correlation based on corresponding states that recognised the important influence of reduced pressure. Dieter Gorenflo argued that the apparently anomalous behaviour of water as a boiling fluid was primarily due to its employment at lower reduced pressures than other fluids. The correlation was incorporated in the VDI-Wärmeatlas and has been continuously improved. The accurate measurement of small azimuthal variations in wall temperature, combined with the analysis of high-speed video recordings, led to important deductions concerning the contribution of coalescing and sliding bubbles to heat transfer in nucleate boiling and their complex dependence on reduced pressure, heat flux and the availability of nucleation sites. These were incorporated in a semi-analytical model that extended earlier interpretations of boiling curves as size distributions of active site density. Dieter Gorenflo campaigned for all the data relevant to boiling performance to be measured in every experiment, surface condition and microgeometry being particularly challenging. In a fruitful collaboration with Dr. Andrea Luke (now Professor of Fluids and Thermodynamics, University of Hannover), he developed two contrasting methods of preparing surfaces reproducibly: sandblasting giving a random texture and grinding with emery paper to give anisotropic features. The texture was measured by scanning on a micron length scale and interpreted by more sophisticated parameters than conventional rms roughness. Variations in surface characteristics between different macroscopic features of enhanced boiling surfaces provided further insights into boiling mechanisms. Examples of continuing developments in these lines of research are given in the papers in this volume.

So far, this note has been about the career of Professor Gorenflo. I would like to end with some brief remarks to fill out the picture of my friend Dieter. It is one of the great pleasures of the international nature of research that professional respect can develop into life-long friendship, despite irregular opportunities to meet. The meetings have always been stimulating and often strenuous. A working day at Paderborn started early, was punctuated by a brief but inviolable period of rest in the middle of the day, might

later include an indulgence in Dieter's enthusiasm for physical exercise and ended much later with a "sleeping beer". I knew that Dieter's graduate students were expected to develop their practical skills on the ski slopes of Davos but my own experience of following Dieter down a steep hill was confined to a descent of the near-vertical cliff below the castle at Lake Bled in total darkness after a particularly good conference dinner. I had complete confidence in his leadership, perhaps because the darkness hid the yawning void below us. Dieter developed an enthusiasm for the English language by listening to the radio as he drove to work early in his time at Paderborn. I think its irregularities appealed to his instinct to develop rules for any complex situation. I was sometimes hard-pressed to provide a rule to justify what I instinctively knew to be a correct usage that conflicted with more logical German grammar, so visits to Paderborn or e-mail consultations about the wording of a paper sometimes led to quick consultations of the Oxford English Dictionary. Dieter's love of a logical approach extends to other aspects of life. I was a passenger in his car on a long drive through a series of mountain tunnels at a time when concerns about fire had led to the batch processing of traffic. Three lanes of traffic followed a stop-go cycle, reducing Dieter's normal speed by an order of magnitude and having the opposite effect on the gap between his car and the vehicle in front. After 50 km, he decided that it was illogical to respond to every cycle and he remained stationary, while the traffic in our lane vanished round a bend. The other lanes appeared to make progress past us and eventually this became unbearable for the driver of the car behind us and she got out to interrogate Dieter. To my amazement, she seemed to accept his explanation and returned, looking slightly bemused, to her car.

Dieter says that he will really retire this time and spend his time renovating the house that he had built with his own hands many years ago in Karlsruhe. I wonder if he will indeed resist the lure of bubbles? Whatever he does next, I am delighted to have this opportunity to congratulate him on his career so far and I am sure I shall be joined by his many friends and colleagues.