

Professor Dr.-Ing. Dr.e.h. Ulrich Grigull on his 75th birthday



ULRICH GRIGULL celebrates his 75th birthday on 12 March 1987. His work in heat transfer spans more than five decades. It was in 1935 when he became an assistant to Ernst Schmidt at the chair of Technische Wärmelehre of the Technische Hochschule Danzig. This laboratory enjoyed enormous renown for heat transfer and attracted students and young scientists from other parts of Europe, such as Ernst Eckert who came from Prague.

All fields of heat transfer were investigated: non-steady heat conduction, for which a graphical differential method was developed; thermal boundary layers, for which the Schatten and Schlieren methods were elaborated; dropwise condensation; radiation properties of surfaces; properties of steam. The work done in Danzig in those days provided in many cases first insights into problems which still occupy our minds today.

Ulrich Grigull became one of the first co-workers of Ernst Schmidt in Braunschweig at the newly built Motoreninstitut of the Deutsche Forschungsanstalt für Luftfahrt in 1937. Here he designed a closed-loop apparatus to study heat transfer in natural convection with ammonia near its critical point. His first publication was—together with E. Schmidt and E. Eckert—“Wärmetransport durch Flüssigkeiten in der Nähe ihres kritischen Zustands” (Heat transport by

fluids in their near critical state) a paper which was considered important enough to be translated into English in a post-war AAF Translation, No. 527, Air Material Command, Wright Field, Dayton. This paper formed the basis of the so-called ‘Schmidt cooling’ of gas-turbine blades proposed in 1942 in a secret report (geheime Kommandosache, Schreiben 1055) to the German Academy of Aeronautics. In present days’ light, this paper, showing that fluids near their critical state are extremely well suited for heat transport by natural convection, can be considered a pioneer paper. Applications of the principle are nowadays found in ‘critical thermosyphon heat pipes’ wherever heat has to be withdrawn from locations difficult to reach or to service. Only recently, it could be proven that a limiting factor of such thermosyphon heat pipes is condensation heat transfer and that an equation proposed by Grigull more than 40 years ago in his doctoral thesis “Wärmeübergang bei der Kondensation mit turbulenter Wasserhaut” (Heat transfer in turbulent film condensation) allows one limiting boundary to be calculated.

During the war, Grigull served as an engineer and officer with the Kriegsmarine; after the war, he became consultant to a chemical and textile firm and director in an insulating firm. In 1953 he joined the engineering section of the Farbenfabriken Bayer AG

in Leverkusen. In 1954 he completed the revised and heavily extended new edition of the book *Grundgesetze der Wärmeübertragung* by Gröber/Erk from 1933.

In 1961, Ulrich Grigull became successor to Ernst Schmidt on the Chair for Thermodynamics at the Technische Hochschule München; a famous chair—Carl von Linde, Moritz Schröter, and Wilhelm Nusselt held it before.

Wide-spanned activities which surrounded him from the very beginning of his career now characterized his research as Professor: the development of optical methods for heat and mass transfer measurements; investigation of basic problems in condensation and evaporation; natural convection in troughs, or in pressure vessels at near critical state, or with exothermic wall reaction; thermophysical properties of water vapour, or carbon dioxide; heat transfer in a Laval nozzle; measurements of the Joule-Thomson coefficient of water and water vapour.

Wide-spanned activities also characterized his university life: in 1972 he was elected Rektor and in 1976 President of the now Technische Universität München. He held this office until his retirement in 1980.

Wide-spanned activities again occupy the Emeritus Grigull: he became President of the International Assembly for Heat Transfer Conferences and President of the International Centre for Heat and Mass Transfer. Now, finally, he was able to follow his long postponed interests in history and technical history in particular: he went to the roots of thermodynamics. His paper "Fahrenheit, a Pioneer of Exact Thermometry" (*Heat Transfer 1986, Proc. 8th International Heat Transfer Conference*, Vol. 1, p. 9/18, Hemisphere, Washington, DC) takes us into the world of the early eighteenth century, when heat, enthalpy and temperature were not distinguished and Isaac Newton called them all 'calor'. In order to measure this, there were such things as thermometers—using

the same principle of liquid expansion as ours—and well-renowned scholars devoted wits and skill on them. Making and calibrating these instruments was the problem. The Florentine Academy was famous for its thermometers, but when the Academy had been dissolved, such instruments were made in various places and were sold by travelling salesmen. Johann Heinrich Lambert as late as 1779 complained in his treatise "Pyrometrie oder vom Maaße des Feuers und der Wärme" (Pyrometry or the measure of fire and heat):

"Those people diverted greatly from the thoroughness practised by the Florentine Academy in the production of their thermometers. And consequently, complaints arose everywhere that the thermometers had no comprehensible scale and that they were by no means corresponding."

Ulrich Grigull—one could not think of him otherwise—performed a thorough investigation on Daniel Gabriel Fahrenheit, who was born in Danzig 301 years ago. In trips to Amsterdam, Florence and London, Grigull searched libraries and archives and he compiled a detailed mosaic of Fahrenheit's and his contemporaries' lives. From their biographies and reports he reconstructed and analysed Fahrenheit's work and rediscovered his 'trick' (the 'artificium') to produce corresponding and accurate thermometers.

A great many honours and awards have been bestowed upon Ulrich Grigull as an outstanding scientist. We also know him and esteem him as an engaged colleague and a helpful and understanding doctoral father.

Last not least, Ulrich Grigull is a founding editor of our Journal. The editors and the world-wide heat transfer community submit their best wishes to Ulrich Grigull, health and happiness to him and his family.

ERICH HAHNE