Professor Dr. Joachim Meissner
Named Honorary Member of the German Society of Rheology (DRG)

Martin Laun

Figure 1: Joachim Meissner

Joachim Meissner (Fig. 1) was born in Sehma/Annaberg, Saxony, Germany, in 1929 [1]. After completion of his education at Bitterfeld high school in 1947, he worked as an apprentice electrician for two years. 1949 he moved to the University of Stuttgart where he majored in physics and received a PhD in 1958 for a thesis on the plasticity of Ni-Co single crystals. In the same year Joachim started his professional career at BASF, Ludwigshafen/Rhein, the first two years being spent in the Plastics Engineering Applications Department, where he got fascinated by the strange non-Newtonian effects observed during extrusion of polyethylene melts. 1960, in the course of the foundation of a new physically oriented research unit, today known as the Polymer Physics Department of BASF polymer research, he was given the task to set up a rheology laboratory. It was the starting point of a success story in the area of experimental rheology and its application to polymer processing. 1970 he became leader of the polymer melt rheology group.

Joachims key contribution to progress in the field was the invention of elongational rheometers making use of rotary clamps (Fig. 2), first published in 1969 [2]. His development made it possible to homogeneously stretch polymer melts at constant Hencky strain rates up to high total strains. Control of true deformation and recoverable strain was possible by cutting the elongated rod with the help of scissors. Important as well, was his invention of the Rheotens [3] (Fig. 3), the application of rotary clamps to measure drawability and melt strength after extrusion, thus bridging the gap between laboratory tests and processing. The commercial version is widely used in chemical industry today.

Since its start in 1963 Joachim has remained an active member of IUPAC Working Party IV.2.1 "Structure and Properties of Commercial Polymers". He coordinated a project on three BASF LDPE melts, nearly indistinguishable in shear and analytical tools used at that time, which, however, showed distinct differences in nonlinear elongational flow. His report published in 1975 [3] became the most frequently cited paper of that group and certainly was a strong motivation to widely apply elongational rheometry. One of the samples, denoted as LDPE Melt I, represents probably the best characterized commercial polymer melt in the literature today. Joachim was very lucky to select this LDPE brand for most of his pioneering experiments, because this melt proved to behave quite good-naturedly.

As a student from Stuttgart university I had the privilege to visit Joachim's BASF laboratory during an excursion in 1970 and to hear him personally introduce his exciting new experiments. I could not anticipate that a few years later I would

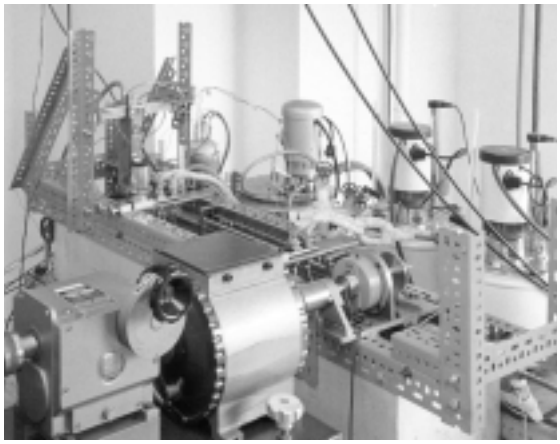

Figure 2 (left): First version of Meissner's rotary clamp elongational rheometer (1968).

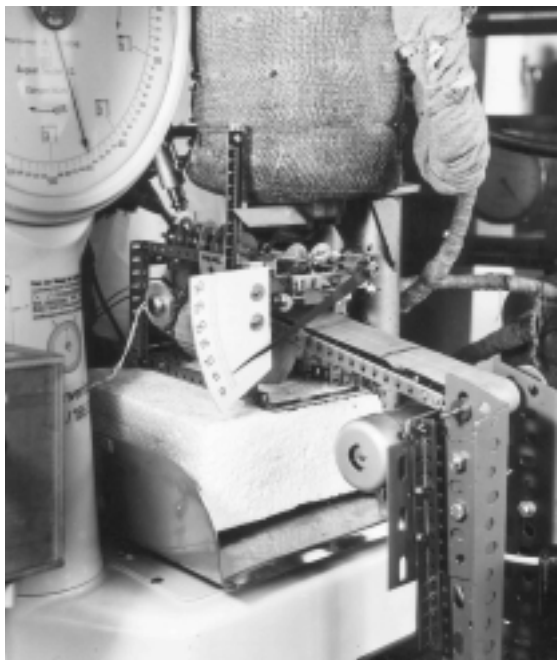

Figure 3 (right): Prototype of the Rheotens (1966).

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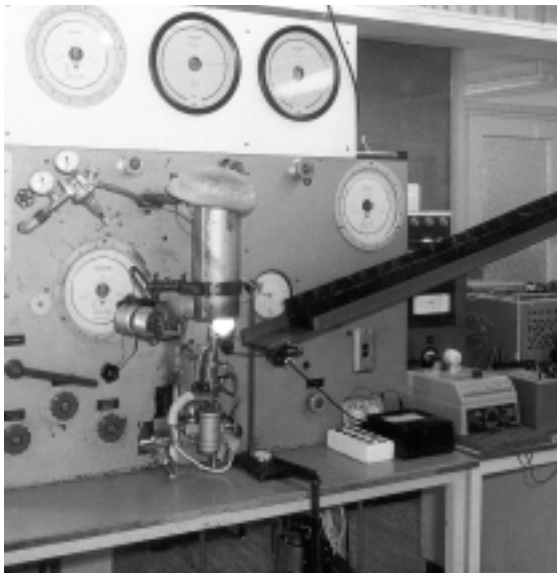

Figure 4 (left): Detail of the modified Weissenberg-Rheogoniometer (1973).

Figure 5 (right): High precision nitrogen capillary viscometer (1968).

become Joachim's successor at BASF and would then widely benefit from his experimental achievements and training of the laboratory staff.

Joachim is a born experimentalist who takes measurements very serious. His strategy is to ask the material by challenging and carefully designed experiments, in the realisation of which he does not accept compromises. With utmost pleasure he presents striking results to the scientific community giving a challenge to provide the interpretation. A very good example for this are his various modifications to the Weisenberg-Rheogoniometer R 16 (Fig. 4) to obtain reliable transients of the shear stress and first normal stress difference, first published in 1972 [5]. Besides stiffening the whole instrument and replacing the original drive and normal force measurement, he focused on temperature control improvements. As a consequence, all transducers were thermostated and the heat sink effect caused by the torque measurement compensated by a additional electrical heating in the shaft. Many years later, to enable reliable measurements of the second normal stress difference [6], he modified the RMS 600 by even introducing silver tools to reduce temperature gradients and fluctuations. "Silver", he liked to joke, "is easy to get in Zürich: just go to any bank in the famous Bahnhofstrasse".

Less well-known is his development of a high precision capillary rheometer using nitrogen gas to control the extrusion pressure in a very wide range[7]. The instrument, equipped with a pneumatic die plug and moving collectors for extrudate cut-offs, allowed to measure the transient flow rate and extrudate swell after a sudden pressure jump (Fig. 5).

Quite remarkable, the scientific recognition of Joachim from his period at BASF lead to a stay as visiting scientist in 1971/72 at the Rheology Research Center of the University of Wisconsin, Madison. His close cooperation with Prof. A. S. Lodge not only resulted in the famous Lodge-Meissner relationship for step shear experiments [8], but also marked the beginning of a more academic orientation. Joachim followed a call of the Eidgenössische Technische Hochschule (ETH) Zürich on the Chair of Polymer Physics in 1974.

At ETH Zürich Joachim kept being fascinated by the unusual and the impossible. Together with his co-workers, rotary clamp elongation rheometry was developed further. His contributions were praised by the 1981 Annual Award of the British Society of Rheology (with H. Münstedt, M. H. Wagner and H. M. Laun) (Fig. 6). A major innovation finally became Joachim's miniaturized version [9], commercialized as Rheometrics Melt Extensional Rheometer (RME), allowing to use small amounts of sample.

His ambitious multiaxial rheometer, some call it "Rheo-Monster", which combines rotary clamp and force measurement into single units, enabled to realise various modes of multiaxial elongation [10], and even changes of mode during one run [11]. Providing reliable transient viscosities of linear and branched polethylene melts in various elongation modes and shear [12] turned out to be an important prerequisite for further progress in theory.

Figure 6: Annual Award of the Britisch Society of Rheology (1981): H Münstedt, MH Wagner, J Meissner, FN Cogswell, JRA Pearson (BSR president), HM Laun.

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Joachim put much emphasis in successfully teaching rheology which helped him attract many bright PhD students. Being a man of vision, he managed to bring into existence a Material Science Department at the ETH Zürich. He also initiated the creation of the Swiss Group of Rheology in 1990. When he officially retired from the ETH polymer physics post in 1996 [13], he remained actively involved in the new ETH venture called the Swiss Rheocenter, working closely with his successor Prof. H. C. Öttinger and Prof. E. Windhab.

We know Joachim as a colourful personality and a very much sought after plenary lecturer at scientific gatherings. In his unique lecturing style he likes to use high quality films to visualize his innovations. Wherever he and his wife Lilo appear, they tend to create what a friend once called the "Meissner vortex", which inevitably draws larger and larger circles to the center.

To honour his outstanding contributions to the progress of elongational and shear rheometry as well as the rheological characterization of polymer melts in general, and his passionate efforts in teaching rheology, the German Society of Rheology (DRG), on the occasion of its 50th anniversary, proudly names Prof. erem. Dr. Joachim Meissner Honorary Member of the Society. The nomination celebration chaired by Prof. Manfred H. Wagner, President of the DRG took place during the Annual Meeting at Berlin, May 14 - 16, 2001.

We cordially congratulate.
Our best wishes are with him and his family.

Martin Laun

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