

THE SEVENTH ALL-UNION RHEOLOGY SEMINAR,

GOMEL, MAY 27-31, 1974

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This Symposium was held on May 27-30, 1974; there were 120 participants, who represented institutes, as follows: Petrochemical Synthesis, Physical Chemistry, Chemical Physics, and Mechanics Problems of the Academy of Sciences of the USSR, the Institute of Polymer Mechanics of the Academy of Sciences of the Latvian SSR, the Institutes of Physics, Heat and Mass Transfer, and Mechanics of Metal-Polymer Systems of the Academy of Sciences of the Belorussian SSR, the Institutes of Colloid Chemistry and Water Chemistry and Geotechnical Mechanics of the Academy of Sciences of the Ukrainian SSR, the Lensovet Leningrad Technological Institute, the Mendeleev Moscow Chemical Technology Institute, the Lomonosov Moscow Institute of Fine Chemical Technology, the Belorussian and Kiev Polytechnic Institutes, and a variety of industrial institutes (the Plastic Research Organization, All-Union Olefin Research Institute, the Rubber Industry Research Institute, the Ukrainian Plastic Machinery Research Institute, the All-Union Electronic Reagents Research Institute, and the Ukrainian Chemical Plant Research Institute), as well as factories such as the Krasnyi Bogatyr' Plant, and the Moscow Petroleum Refinery. The organizers of the symposium were the Topchiev Institute of Petrochemical Synthesis, Academy of Sciences of the USSR, the Institutes of Heat and Mass Transfer and Mechanics of Metal-Polymer Systems, Academy of Sciences of the Belorussian SSR, and the Commission on the Mechanics and Physics of Polymers, Presidium of the Academy of Sciences of the USSR.

The papers aroused lively discussions, and these covered most of the rheological research teams in the Soviet Union (from Moscow, Minsk, Leningrad, Kiev, Riga, Kalinin, Baku, Perm, Gor'kii, Yaroslavl, Volgograd, L'vov, and Sverdlovsk).

Numerous papers dealt with polymer rheology. Dynamic methods have given information on the rheological properties of linear polymers and compositions based on these over a wide range of temperatures and strain rates. Much attention has been given to the rheological properties of polymer mixtures, as well as to research on the widely used polyolefins. Results were also reported on researches on the rheology of solutions and polymer gels.

A considerable part of the symposium was taken up with polymer processing topics: extrusion, calendering, mixing, and the rheology of metal-polymer compounds and composite materials using cold-setting resins and rubbers. Particular attention was given to polymer additives that reduce turbulent friction in pipes of various shapes.

Results were presented on researches on plastic dispersed systems and mineral suspensions, as well as the effects of electrical and magnetic fields on heat and mass transfer in disperse systems.

At the end of the symposium, a resolution was adopted on the state of Soviet theoretical and experimental research in rheology. It was observed that the experimental basis tends to be weak, in particular in a lack of advanced rheometric instruments and of organizations specializing in the design and manufacture of these.

Translated from *Inzhenerno-Fizicheskii Zhurnal*, Vol. 27, No. 5, pp. 928-929, November, 1974.

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Three major fundamental tasks in rheology were set down:

a) polymer rheology in relation to strain and flow in the production of filaments, films, and shaped components;

b) the mechanical properties of systems that combine the valuable properties of metals and polymers;

c) electrical and magnetic rheology of dispersed compositions, both mineral and synthetic, incorporating heat and mass transport.

RESOLUTION FROM THE SYMPOSIUM

The Symposium noted the increasing importance of rheology in handling many important tasks in accelerating or optimizing production processes and in producing advanced technology and new instrumentation for the chemical industry and other areas of the national economy. The following are examples: efficient means of producing metal-polymer systems for machinery and instruments, building, and agriculture, in order to provide high performance and corrosion protection; development of essentially new methods of fiber production using mixtures of polymers; manufacture of strong film materials and coatings, including two-component films; design of new high-throughput thermochemical and mass-transfer equipments using electrical and magnetic rheological effects, as well as formulation of mathematical models for technological processes involving heat and mass transfer in media in order to automate and optimize processes.

The Symposium assigned great significance to rheological methods (measurement of viscosity, plasticity, etc.) to characterize raw material and product quality, in particular in standardization; the major advances in theoretical rheology in the USSR should thus facilitate improvement in traditional methods of plant design for industrial purposes. It is very promising to use rheological methods to examine material structure and to forecast required combinations of properties, which is particularly important in making composite materials and advance technology.

On the other hand, the Symposium observed that the position in rheology instrumentation was poor, in particular as regards supply of laboratories with automatic equipment, and a request was made to the Scientific Instrumentation Commission of the Academy of Sciences to concentrate the production of new instruments in the pilot plant in Chernogolovka, Moscow Region, with a further request to the Ministry of the Chemical Industry to designate one of the special design branch offices as concerned with the design and production of new instruments for industry and research laboratories.

It was also felt desirable that the Mendeleev All-Union Chemical Society should set up a body that would coordinate rheological research and developments in the many organizations concerned with this; the symposium also considered it desirable to organize a rheology section in the All-Union Council for Heat and Mass Transfer in Technological Processes.

It was also pointed out that great advantage comes from regular meetings of specialists in various branches of science and technology, particularly workers in industry and agriculture in the Union Republics. Therefore, the participants in the Symposium considered it necessary to meet not less often than once in two years in All-Union Symposia on rheology, while in the interval between these there should be schools, which are of extreme importance for training junior staffs and raising the theoretical level of practical workers.

The participants in the Symposium expressed their indebtedness to the Directors of the Laboratory of Polymer Rheology at the Institute of Petrochemical Synthesis and the Institute of Heat and Mass Transfer of the Academy of Sciences of the Belorussian SSR for their initiative in organizing the symposium, and to the Institute of Metal-Polymer Systems of the Academy of Sciences, Belorussian SSR for performing the valuable practical work of organization. A large part has been played, particularly in recent

years, in advancing rheological research by the "Journal of Engineering Physics" and "Polymer Mechanics," and thanks were expressed to the editorial boards of these journals for directing attention to rheological topics. The participants expected that in the future these journals would play a major part as centers actively facilitating progress in Soviet Rheology.

It was considered desirable to publish the Symposium papers as a volume.