

CHRONICLES

FIFTH ALL-UNION CONFERENCE ON HEAT EXCHANGE AND HYDRAULIC RESISTANCE IN THE MOVEMENT OF A TWO-PHASE STREAM IN ELEMENTS OF POWER MACHINERY AND APPARATUS

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The Fifth All-Union Conference on Heat Exchange and Hydraulic Resistance in the Movement of a Two-Phase Stream in Elements of Power Machinery and Apparatus was held in Leningrad from September 15 to 18, 1974.

The Conference was convened by the State Committee of the Council of Ministers of the USSR on Science and Technology (SCST), the Academy of Sciences of the USSR, the Ministry of Heavy Power and Transport Mechanical Engineering of the USSR, the Scientific Council of the Academy of Sciences of the USSR on the Problem of Thermophysics, the Scientific Council on the Problem of Mass and Heat Transfer in Technological Processes of the SCST, the I. I. Polzunov Central Scientific-Research and Design-Construction Institute for Boilers and Turbines (CIBT), the Institute of High Temperatures, Academy of Sciences of the USSR, the National Committee on Heat and Mass Exchange, and the Central Board of the Scientific and Technical Society of Electric Power Stations and the Electrotechnical Industry.

About 800 delegates from 168 scientific organizations, universities, and industrial enterprises from 52 cities of the Soviet Union took part in the work of the Conference. In all, 50 review reports abstracting 280 works presented by participants of the Conference were heard and discussed at the plenary and sectional sessions.

The Conference was opened by Academician-Secretary M. A. Styrikovich of the OFTPE, Academy of Sciences of the USSR. In his address he elucidated questions of the current state of energy resources and prospects for the development of power engineering. Then the Director of the I. I. Polzunov CIBT N. M. Markov gave an address on "Current trends in the development and work of the CIBT on the creation of new power equipment."

Professor B. S. Petukhov, Corresponding Member of the Academy of Sciences of the USSR, S. S. Kutateladze, Academician of the Academy of Sciences of the Ukrainian SSR, V. I. Tolubinskii, and Prof. V. M. Borishanskii gave addresses devoted to the fundamental problems of hydrodynamics and heat exchange in two-phase streams.

The subsequent work of the Conference was carried out by two sections.

1. Heat exchange and hydrodynamics in the boiling of liquids under conditions of free convection, condensation of vapors and evaporation, heat exchange and hydrodynamics in the near-critical region (P_{cr} , T_{cr}), and the analysis of the operation of elements of power-generating equipment.

2. Heat exchange and hydrodynamics in the organized movement of a two-phase stream in pipes and channels, heat exchange and hydrodynamics of fast-moving vapor-liquid streams, and the heat-exchange crisis in free convection (large volume) and in the organized movement of a two-phase stream (pipes, channels).

A great many reports in the first section were devoted to the study of the mechanism of boiling under various conditions (natural convection, in a region of low pressures). Of fundamental interest are

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works in which the mechanism of boiling at surfaces with coatings and heat exchange during boiling at corrugated surfaces and in slotted channels are analyzed. The results of the experimental study of these processes are presented in the reports and the methods of thermal calculation are given.

Great attention was paid to problems of heat and mass exchange during the condensation of vapors. The calculated analysis of the effect of various factors on the condensation of metallic vapors and the calculation of the condensation of vapors from vapor — gas mixtures, based on the solution of the one-dimensional problem, are of practical interest. Questions of the kinetics and heat exchange in evaporative systems were also discussed.

In the second section many reports were presented on hydraulics and heat exchange in the flow of annular and dispersed-annular two-phase streams. A general hydrodynamic model of the dispersed-annular two-phase streams. A general hydrodynamic model of the dispersed-annular mode of flow was examined which makes it possible to take into account processes of evaporation, condensation, the separation of drops from a liquid boundary film, and deposit onto it. In the reports extensive experimental material was presented on the heat exchange, hydrodynamics, true volumetric vapor content, and flow boundaries of two-phase media.

Notice should be taken of the reports devoted to one of the urgent questions of the present time — the heat-exchange crisis in vapor-generating channels. Studies of the conditions of appearance of the crisis have been performed. A method for calculating the limiting vapor content has been obtained which comes down to the construction of a curve of the variation in the liquid flow rate in the boundary film as a function of the channel length. Accordance is noted in the experimental data of different authors on the crisis.

In both sections an extensive discussion was held on the reports, which permitted the specialists to exchange information on many of the problems of the heat exchange and hydrodynamics of two-phase media.

In the resolution adopted at the concluding plenary session the increased level and the expansion of the subject matter of the scientific reports is noted and the principal directions of their development are given. The expansion of studies of the mechanism of heat and mass exchange processes and the structure of two-phase streams and the development on this bases of more refined theoretical models of calculating these processes, resulting in the creation of reliable design recommendations required for the planning of modern and future equipment, are recommended.