

CHRONICLES

FOURTH ALL-UNION CONFERENCE ON HEAT EXCHANGE AND HYDRAULIC RESISTANCE IN A TWO-PHASE FLOW IN ELEMENTS OF POWER MACHINES AND EQUIPMENT

B. L. Paskar' and M. Ya. Belen'kii

The fourth All-Union Conference on heat exchange and hydraulic resistance in the two-phase flow in elements of power machines and equipment was held from January 26-29, 1971.

The Conference was called by the State Committee of the Soviet of Ministers of the USSR for science and technology, the Academy of Sciences of the USSR, the Ministry of Heavy, Power, and Transport Engineering of the USSR, the Scientific Soviet of the Academy of Sciences of the USSR on the problem of "High temperature thermophysics," the Soviet of heat and mass transfer in technological processes, the State Committee for Science and Technology and the I. I. Polzunov Planning-Design Boiler-Turbine Institute, and the Institute of High Temperatures of the Academy of Sciences of the USSR.

More than 650 delegates from 123 scientific, design, and planning organizations, industrial undertakings, and higher educational establishments from 52 towns of the Soviet Union took part in the work of the conference.

The Conference was opened by the Academician-Secretary of the OF TPE of the Academy of Sciences of the USSR, M. A. Styrikovich. Then the director of the I. I. Polzunov Central Scientific Research and Design Boiler Turbine Institute, Prof. N. M. Markov addressed the assembly with his introductory speech. In his introductory address the speaker stressed that at present the problem of primary importance is the rapid development and publication of scientifically based standards of thermal and hydraulic calculations of elements of machines and plant. Prof. V. M. Borishanskii explained the questions of the scientific trend of the conference.

The plenary consisted of reports on the fundamental problems of hydrodynamics and heat transfer in two-phase media: Prof. B. S. Petukov gave an address on "Heat transfer in turbulent flow of a liquid in a single-phase near-critical region," Prof. V. M. Borishanskii on "Modern concepts of thermal calculation of a vapor-generating surface," and Prof. M. E. Deich on "Special features of flow of two-phase media in the flow paths of turbines."

The next part of the work of the conference was divided into two sections:

- 1) Heat exchange and hydrodynamics in boiling, condensation, and evaporation. The heat transfer and hydrodynamics are in the near-critical region (T_{CR} , P_{CR}).
- 2) Heat transfer and hydrodynamics in the organized movement of a flow and heat transfer crises.

In the first section problems associated with heat transfer and the boiling crisis in conditions of free convection, problems of heat transfer in film condensation on vertical and horizontal surfaces, the special features of a two-phase flow in nozzles, and heat transfer in the near-critical region of the parameters of the state are examined.

Considerable attention was paid in a number of reports to the mechanism of boiling. The results given on the dynamics of active centres of vapor formation, the mechanism of breaking away from the heating surface, the special features of boiling in the case of different accelerations due to gravitational forces enabled the representation of the physical picture of the process to be considerably widened.

Translated from *Inzhenerno-Fizicheskii Zhurnal*, Vol. 21, No. 1, pp. 188-189, July, 1971.

© 1973 Consultants Bureau, a division of Plenum Publishing Corporation, 227 West 17th Street, New York, N. Y. 10011. All rights reserved. This article cannot be reproduced for any purpose whatsoever without permission of the publisher. A copy of this article is available from the publisher for \$15.00.

The work on investigation into the boiling of a liquid at reduced pressure is of special interest. A considerable difference is noticed between this mechanism and boiling in conditions of atmospheric pressure, and a similarity between this type of boiling and the boiling of liquid metals is observed.

A number of reports give results on theoretical and experimental research on two-phase flow in plane channels. It is shown that for the investigated coarsely dispersed vapor-water flows, the reduction of the velocity coefficient with increase of the initial moisture depends most of all on the losses which occur during relative movement of the phases. It is established that in the case of adiabatic flow of saturated water and water underheated to saturation through the nozzles, the main factors determining the nature of the flow are the possible metastability of the flow and the change-over of the structure of the flow.

The works devoted to analysis of nonsteady flows and the stability of two-phase flows were also of great interest.

In the meetings of the second section problems associated with heat exchange and hydrodynamics of the boiling of liquids in tubes were discussed. Extensive experimental and theoretical material on calculation of the thermodynamic characteristics of channels of different shape is given in the reports.

The reports devoted to theoretical research on the kinematics and dynamics of turbulent gas-liquid flows and two-phase flows with thermal and dynamic interaction of the phases attract attention.

The works on new experimental methods of investigating two-phase flows must be noted. In these works methods of measuring the main characteristics of two-phase flow are analyzed: the actual gas content, the actual velocities of the phases, the pulsation characteristics of the flow, a description is given of the electrochemical method of measuring friction and friction pulsations on the walls of the channel; the results of measurements of the average tangential stress in vertical and horizontal channels are given.

A number of reports were devoted to investigating the heat transfer crisis in the boiling of a liquid in a channel. In these speeches it was noted that the nature of this phenomenon is quite complex, and the models which explain the occurrence of the crisis in the flow of a liquid in tubes, sometimes directly contradict the experimental data which have been obtained. An extensive exchange of ideas on the mechanism of the occurrence of the crisis enabled the ideas about the nature of this phenomenon to be somewhat extended.

The discussion carried out in both sections enabled specialists to exchange ideas on many problems of heat transfer hydrodynamics of two-phase media.

Unlike the previous conferences, a limited number of reports was heard and the number of sections was reduced. Because of this, many of the reports given were in the nature of a review. This enabled the main problems of thermophysics and hydrodynamics of two-phase flows to be examined more deeply.

In the resolution which was adopted at the final plenary session, the results of the scientific work were summed up, and the development of more progressive trends in research on heat exchange and hydrodynamics of two-phase flows was noted. The necessity for holding working coordination meetings on some problems was noted.