

## FOREWORD

Heavy demands are traditionally placed on launchers, orbital stations, spacecraft, satellites, interplanetary stations, spacecraft-aircraft (shuttles), and various missiles as far as reliability and mass-size, and economic efficiency of structures are concerned. Search for new approaches to the design and arrangement, introduction of advanced methods and technical means of design, development of new technologies of manufacture of materials and structures, and tests and economic analysis are necessary to meet these demands.

The International Scientific Conference "Space-Rocket Technology: Fundamental Problems of Mechanics and Heat Transfer" (RST-98) organized by the N. É. Bauman Moscow State Technical University, the State Enterprise "Moscow Institute of Thermal Engineering," and the S. P. Korolev Space-Rocket Corporation "Energiya" with support from the Ministry of Science and Technology of the Russian Federation, the Ministry of General Education and Vocational Training of the Russian Federation, the Russian Space Agency, the Russian Foundation for Fundamental Research, and information assistance from the International Society for the Advancement of Material and Process Engineering (SAMPLE) was held in Moscow on November 10-12, 1998. Professor I. B. Fedorov, Rector of the N. É. Bauman Moscow State Technical University and Professor Yu. N. Koptev, General Director of the Russian Space Agency, were co-chairmen of the Scientific Program Committee; Professor V. I. Usyukin was chairman of the Organizing Committee.

The Conference program included 202 reports prepared by scientists from Belarus, Germany, China, Russia, USA, the Ukraine, and France. Among 371 authors there were 72 doctors and 160 candidates of sciences. The authors of the reports represented 69 institutions, including virtually all domestic scientific-research and design organizations, and industrial centers specializing in space-rocket production, and also 17 universities from Germany, Russia, and the Ukraine. More than 350 participants took part in the Conference. Six plenary reports were heard. Oral and poster reports dealing with new designs of rockets, engines, and spacecraft, topical problems of the mechanics and heat transfer of structures, and advances in the technologies of manufacture of rockets and spacecraft, the economy, and education were discussed at four sessions.

The report on the state and prospects of development in rocket building and astronautics in Russia made by Professor Yu. N. Koptev, General Director of the Russian Space Agency, the report on peaceful applications of military rocket technologies made by Professor Yu. S. Solomonov, Director and General Designer of the Moscow Institute of Thermal Engineering, the report on the ideas, problems, and prospects for carrying out the "Sea Start" program made by V. P. Legostaev, Corresponding Member of the Russian Academy of Sciences, First Deputy General Designer of the Space-Rocket Corporation "Energiya," the report on development of launchers ranging from "Proton" to "Angara" made by Professor V. K. Karrask, First Deputy General Designer of the Design Bureau "Salyut" of the M. V. Khrunichiev State Space Science and Production Center, and the report on problems of space radioastronomy made by N. S. Kardashev, Academician of the Russian Academy of Sciences, Director of the Astrospace Center of the P. N. Lebedev Physical Institute of the Academy of Sciences, were heard at the opening session of the Conference.

The Conference was timed to coincide with the 50th anniversary of the scientific school on rocket and space technology founded by Academician S. P. Korolev and Corresponding Member of the Academy of Sciences of the USSR V. I. Feodos'ev at the N. É. Bauman Moscow State Technical University. The well-known scientists – Academicians V. P. Barmin, K. S. Kolesnikov, V. N. Chelomei, Professors L. I. Balabukh, N. F. Krasnov, Yu. A. Pobedonostsev, and others – contributed much to the formation and development of the school. Successes of this scientific school in solution of heat transfer problems are associated with the names of Professors G. B. Sinyarev, V. S. Zarubin, V. N. Eliseev, and B. G. Trusov. Ten doctors and more than

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eighty candidates of sciences were trained under their supervision. The works of the specialists of the school in the fields of thermodynamics of rocket engines, simulation of temperature and stressed-strained states of load-bearing structures, thermal protective coatings made of composite and semitransparent materials, in creation of the algorithms and programs for solving inverse problems of radiative-conductive heat transfer and procedures of thermal tests of structural elements on the benches of radiative heating, and in development of the procedures for determination of thermophysical and optical properties of composite materials have gained wide recognition. The results of scientific studies are actively introduced to the training process.

The papers presented in this issue are devoted mainly to the problems of heat transfer in rocket-space technology and are reported at the Conference RST-98. We express hope that the materials published will be of interest to specialists working in the field of thermophysics and mechanics and also for young scientists and will facilitate scientific cooperation between scientists of different countries.

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