CHRONICLES

JOINT CONFERENCE OF THE SECTIONS OF THE SCIENTIFIC SOVIETS OF THE STATE COMMITTEE ON SCIENCE AND TECHNOLOGY AND THE ACADEMY OF SCIENCES OF THE USSR

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On April 6-7, 1978, in Minsk a joint conference was held of the section on Heat Transfer by Radiation of the Scientific Soviet on Problems of Mass and Heat Transfer in Technological Processes of the State Committee of the Soviet of Ministers of the USSR on Science and Technology, and the section on Heat and Mass Transfer of the Scientific Soviet on Complex Problems in Thermal Physics of the Academy of Sciences of the USSR.

The conference discussed, among other things, the following two problems:

1. The state of the problem and the future prospects for developing methods for the mathematical simulation of radiation and complex heat transfer in technological processes.

2. The proposals of the commission on the development of a mathematical model of a forest fire.

The conference was opened by Corresponding Member of the Academy of Sciences of the USSR R. I. Soloukhin. The work of the conference was led by the chairmen of the above-mentioned sections, Corresponding Member of the Academy of Sciences of the USSR B. S. Petukhov, and Doctor of Technical Sciences A. G. Blokh.

The problems of the first group which were discussed included the present state and further development of methods for the mathematical simulation of heat transfer by radiation in the real spectrum (B. G. Sevast'yanenko), mathematical methods of solving problems of radiant–conductive heat transfer (A. A. Kobyshev), and methods for the mathematical simulation of radiation heat transfer in metallurgical heat technology (A. S. Nevskii and V. G. Lisienko). Several of the papers were devoted to the mathematical simulation of the optical characteristics of molecular gases (V. G. Sevast'yanenko, R. I. Soloukhin, and I. F. Golovnev) and methods of calculating their radiation based on simulation of the spectral composition (Yu. V. Khodyko). There was considerable interest in a communication on the mathematical simulation of complex heat transfer taking into account the spectrum of the combustion products, and scattering and reflection of the fluxes for a plane layer in which the selectively absorbing, radiating, and scattering medium moves (S. P. Detkov and O. A. Khalevich).

To solve the problem of the hypersonic flow around a blunt body by a radiating gas when there is intense evaporation on the front surface, a gasdynamic model of the flow of a nonviscous gas was used, taking into account its optical characteristics in the shock layer and the evaporation products (V. N. Mirskii and V. P. Stulov).

In one of the contributions (by I. R. Mikk) a method was proposed for measuring and processing experimental data when investigating complex heat transfer.

The results of research carried out by a group of workers (K. S. Adzerikho, V. P. Nekrasov, V. P. Trofimov, et al.) on the simulation of problems of radiant heat transfer in media with nonplanar geometry were presented, in which an algorithm for calculating the spectroscopic characteristics for a finite cylinder was given.

The mathematical simulation of the radiation properties of surfaces and their use in calculations of heat transfer by radiation including radiation taking into account anisotropy was considered in a number of communications (L. N. Ryzhkov, S. P. Rusin, V. D. Dmitriev, S. G. Agababov, etc.), and was of considerable interest to the delegates.

The results of a mathematical simulation of the radiational and complex heat transfer in electrical circuits presented by Yu. M. Ageev et al. received high praise. The promising

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prospects for the use of electrical simulation for this purpose based on modern electrical engineering and computational techniques were noted.

In a theoretical paper (Yu. A. Surinov and L. V. Ponomareva) the application of three forms of a generalized zonal method for the most general formulation of the problem of radiant heat transfer in a multizonal chamber of rectangular cross section of arbitrary length filled with a nonuniform absorbing and scattering medium was described.

The refinement of the individual parameters of the zonal method of calculating the radiation of triatomic gases and coke particles using a generalization of experimental data enabled recommendations to be made for calculating the heat transfer by radiation in the furnaces of boiling apparatus (V. V. Mitor, I. N. Konopel'ko, and L. V. Latysheva).

Analytical and numerical methods of calculating radiation–conduction heat transfer as it applies to the elements of electrovacuum devices, the use of which enables one to obtain the required information on their thermal state fairly rapidly were described by V. S. Koshelev, G. M. Tsymbalov, and V. N. Shevtsov.

The sections pointed out the importance of the further development of the physicomathematical principles of simulating radiation and complex heat-transfer processes, analytical methods of the theory of radiant heat transfer, the mathematical simulation of the optical characteristics of gaseous media, and the radiation properties of the constructional materials of the surfaces of apparatus, and also the development of work on the mathematical simulation of the radiation and complex heat transfer as it applies to specific technological processes and industrial apparatus (metallurgical furnaces, tube furnaces in the petrochemical industry, furnaces for heating steam generators, etc.). The importance of starting on the construction of standardized methods of heat calculations for fundamental types of certain apparatus (including metallurgical furnaces) was acknowledged.

The need for further development of zonal methods of calculating heat transfer by radiation in metallurgical furnaces, the tube furnaces of the petrochemical industry, and furnaces for heating power apparatus, etc., taking into account the combustion processes, was pointed out.

It was also mentioned that an important problem in the development of mathematical models of radiation and complex heat transfer is their compatibility with existing technological processes.

A. M. Grishin addressed the conference on the second problem, viz., the development of a mathematical model for a forest fire.

The existing models of forest fires describe either individual forms of fires or individual parts of this phenomenon, ignoring all the processes which occur and which have an effect on them.

As a result of the discussion of preliminary material, a physicomathematical model was proposed, developed on the basis of the mechanics of the reacting media. It differed from other models in the fact that it took into account the fundamental physicochemical processes occurring in forest fires: and the laws of conservation of energy, momentum, and mass were used in its mathematical description. The proposed model takes into account the fact of atmospheric processes, the forest-vegetation conditions, the structure and type of burning materials, and the topographic characteristics of the locality.

It was recommended that work on improving data and of compiling special models for practical application in developing means of extinguishing forest fires should be extended.

Organizational measures were proposed for the practical checking of scientific research in this region.

Various scientific problems of considerable interest were discussed at the conference. Seventy-seven specialists took part (including two Corresponding Members of the Academy of Sciences of the USSR, 21 doctors, and 41 Candidates of Science), and 44 scientific-research organizations and higher educational institutes were represented (TsKTI, ENII, IVTAN, ITMO AN BSSR, ITTF AN UkrSSR, IF AN BSSR, VNIIMT, MEI, et al.).