

Preface

A number of technical processes and natural phenomena are accompanied by heat transfer concerned with media thermal radiation. Generally, thermal radiation is thought to be relevant only at high temperatures. This widespread error is easily overcome if we remember, for example, that the weather and climate on our planet is mainly determined by thermal radiation of cloudy atmosphere and the Earth surface. Few people are aware, that quality rise of ordinary sleeping-bag is connected with changing of radiation transfer conditions in fibrous material.

In examples mentioned, as well as in many other cases, radiation emissivity, absorption and scattering take place in the medium, containing particles comparable with radiation wavelength. Such media are customary called disperse systems. One has to solve radiation heat transfer problems for disperse systems in highly different applications such as heat transfer in solid propellant rocket engines and magnetohydrodynamic generators, industrial technology of synthetic filaments production, propagation of microwave radiation in rain, and spacecraft thermal control through the use of droplet radiators.

In many problems the radiation heat transfer is not a sole transfer mode and it will be considered simultaneously with conduction and convective heat transfer. A rigorous mathematical statement of such problems is very complex, and therefore one is limited to an approximate description of radiative properties, as well as radiation transfer.

It should be noted, that in students teaching on heat transfer the main attention (at least in Russia) is paid to the study of the conduction and convection processes, but radiation heat transfer problems, particularly in scattering media, are beyond the scope of the majority of high-school programs. There are not enough manuals available on this subject.

All the above mentioned facts caused the appearance of this book. Data choice and their presentation manner are based on the author's experience of collaboration with students and postgraduate students of Moscow Institute of Physics and Technology. Previous publications served as the basis of the present paper.

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