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HEAT AND MASS TRANSFER

A Transport Phenomena Approach

The book introduces study of heat and mass transfer from the view point of transport phenomena. The book aims at developing the subject from basic levels but includes topics of contemporary interest. This approach allows a student to learn basic material and also have an idea of advanced applications. The special feature of the book is in solving problems, and offering explanations both from a mathematical view point and rationalization from a physical basis. Another important aspect of the book is the emphasis placed on scaling and understanding dimensionless groups. With the belief that students should be enabled to work on applications, chapters on computational fluid dynamics and turbulence are included in the book. These aspects distinguish this book from other books on transport phenomena. It starts with foundations and description of heat transfer in terms which are easy to grasp. The quantitative analysis of heat transfer progresses from shell balances, to the general equations of change of temperature. The problems solved include examples of steady and unsteady conduction, convection with short and long contact times, and natural convection. Analysis of phase change is one of the advanced topics covered. Mass transfer is covered taking advantage of the experience gained from a study of heat transfer. The coverage progresses from dilute binary systems to multicomponent systems. Problems solved include steady and unsteady diffusion in binary and multicomponent systems, mass transfer with chemical reaction, high flux corrections, and convective mass transfer in dilute solutions. Advanced topics covered are fuel cells, centrifugal separations and crystal growth.

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