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Autore	Lienhard John H. <1930->
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5.2 Lumped-capacity solutions; 5.3 Transient conduction in a one-dimensional slab; 5.4 Temperature-response charts; 5.5 One-term solutions; 5.6 Transient heat conduction to a semi-infinite region; 5.7 Steady multidimensional heat conduction; 5.8 Transient multidimensional heat conduction; Problems; References; III Convective Heat Transfer; 6 Laminar and turbulent boundary layers; 6.1 Some introductory ideas; 6.2 Laminar incompressible boundary layer on a flat surface; 6.3 The energy equation; 6.4 The Prandtl number and the boundary layer thicknesses; 6.5 Heat transfer coefficient for laminar, incompressible flow over a flat surface; 6.6 The Reynolds analogy; 6.7 Turbulent boundary layers; 6.8 Heat transfer in turbulent boundary layers; Problems; References; 7 Forced convection in a variety of configurations; 7.1 Introduction; 7.2 Heat transfer to and from laminar flows in pipes; 7.3 Turbulent pipe flow; 7.4 Heat transfer surface viewed as a heat exchanger; 7.5 Heat transfer coefficients for noncircular ducts; 7.6 Heat transfer during cross flow over cylinders; 7.7 Other configurations; Problems; References; 8 Natural convection in single-phase fluids and during film condensation; 8.1 Scope; 8.2 The nature of the problems of film condensation and of natural convection; 8.3 Laminar natural convection on a vertical isothermal surface; 8.4 Natural convection in other situations; 8.5 Film condensation; Problems; References; 9 Heat transfer in boiling and other phase-change configurations; 9.1 Nukiyama's experiment and the pool boiling curve; 9.2 Nucleate boiling; 9.3 Peak pool boiling heat flux; 9.4 Film boiling; 9.5 Minimum heat flux; 9.6 Transition boiling and system influences; 9.7 Forced convection boiling in tubes

Sommario/riassunto

This introduction to heat transfer offers advanced undergraduate and graduate engineering students a solid foundation in the subjects of conduction, convection, radiation, and phase-change, in addition to the related topic of mass transfer. A staple of engineering courses around the world for more than three decades, it has been revised and updated regularly by the authors, a pair of recognized experts in the field. The text addresses the implications, limitations, and meanings of many aspects of heat transfer, connecting the subject to its real-world applications and developing students' ins