25 **Abu-Ghannam B. J. and Shaw R.** Natural Transition of Boundary Layers, *J. of Mech. Engng. Sci.*, **22**, *1980*

26 **Seyb N. J.** The Role of Boundary Layers in Axial Flow Turbomachines and the Prediction of their Effects, *AGARD AG164, No. 241, 1972*

27 **Blair, M. F.** Influence of Free-Stream Turbulence on Boundary Layer Transition in Favourable Pressure Gradients, *J. Engng. for Power*, **104**(*4*), *Oct. 1982, 743–750*

28 **Winoto S. H.** Review of the Literature on Goertler Vortices, *Imperial College, London, Mechanical Engineering Department, Sept. 1976*

29 **Smith A. M. O.** On the Growth of Taylor-Goertler Vortices Along Highly Concave Walls, *Quarterly Journal of Applied Maths*, **13**(*3*), *1955, 233–262*

30 **Hall P.** The Linear Development of Goertler Vortices in Growing Boundary Layers, *J. Fluid Mech.*, **130**, *1983, 41–58*

31 **Hall P.** Taylor-Goertler Vortices in Fully Developed or Boundary-Layer Flows: Linear Theory, *J. Fluid Mech.*, **147**, *1982, 475–494*

32 **Lauder B. E.** Laminarization of the Turbulent Boundary Layer by Acceleration, *MIT Gas Turbine Laboratory Report No. 77, 1964*

33 **Kearney D. W. et al** Heat Transfer to a Strongly-Accelerated Turbulent Boundary Layer: Some Experimental Results Including Transpiration, *Int. J. Heat Mass Transfer*, **16**, *1973, 1289–1305*

34 **Moretti P. M. and Kays W. M.** Heat Transfer to a Turbulent Boundary Layer with Varying Free-Stream Velocity and Varying Surface Temperature – an Experimental Study, *Int. J. Heat Mass Transfer*, **8**, *1965, 1187–1202*

BOOK REVIEW

Heat Conduction

U. Grigull and H. Sandner

Fundamental concepts of conduction, initial and boundary conditions are introduced briefly in chapter 1. Thermal conductivity of metals, liquids, gases and laminated bodies is considered in chapter 2. This chapter is well written and quite informative. Chapter 3 covers one-dimensional, steady conduction through slabs, cylinders, spheres and simple fins, with several interesting examples of application of the theory.

One-dimensional conduction through slabs, cylinders and spheres containing uniformly distributed heat sources is summarized very briefly in chapter 4. An example of the application of the theory to a cylindrical nuclear fuel element is given. It is not clear why the authors placed this material in a separate chapter of only two pages.

Chapter 5 discusses multidimensional steady conduction and the various analytical tools available for such problems. The analytical tools are limited to Kirchhoff's transformation, conformal mapping, and the method of fictitious heat sources and sinks. Experimental analogue methods, graphical methods and the relaxation method are discussed briefly. This chapter introduces the concept of thermal resistance and conduction shape factor and ends with a summary of shape factors applied to several two-dimensional configurations. The authors have not discussed other analytical methods such as separation of variables and Fourier sine or cosine transforms which are very useful in several coordinate systems.

Chapter 6 is the longest and best written section. The authors discuss the application of several analytical methods such as the Boltzmann and Laplace transformations, separation of variables, Duhamel's theorem to transient one-dimensional conduction in slabs, cylinders, spheres and semi-infinite bodies. Analogue and finite-difference methods are applied to simple examples. The chapter ends with periodic temperature variation in an isotropic, semi-infinite body.

Chapters 7, 8 and 9 cover instantaneous and continuous point and line sources as well as moving sources. These chapter are well written and give the reader a clear picture of the underlying physical concepts. Other conduction texts should include the topics covered in these chapters.

A brief summary of the applications of the one-dimensional transient solutions to multi-dimensional conduction within several bodies is presented in chapter 10. Chapter 11 has a brief description of conduction with phase change in a semi-infinite body, and several good examples with industrial applications

The appendices contain units, universal constants of physics, dimensionless groups in heat and mass transfer, thermophysical properties of selected solids, liquids and gases, and short tables of Gauss's error function, exponential integral and modified Bessel functions.

Overall this introductory test is well written, covers a wide range of topics and should be included in a list of reference texts on conduction. Professor Kestin's translation of the original German text is excellent and the Series Editors are to be congratulated for bringing it to the attention of the English speaking heat transfer community.

M. M. Yovanovich
University of Waterloo,
Ontario,
Canada

Published, price DM89 or $32.40, by Springer-Verlag/Hemisphere. Springer-Verlag, Heidelberger Platz 3, Postfach, D-1000 Berlin 33, FRG