BOOK REVIEW

LÁSZLÓ IMRE: Hőátvitel összetett szerkezetekben: Heat Transfer in Composite Constructions

Akadémiai Kiadó Budapest, 1983. 697 pp., 160 figures.

All engineering, electrical and construction designs consists of a large number of elements varying in geometry and material. In some of these composite designs thermal processes take place. For economic manufacture, safe operation and further development it is of primary importance to know the temperature distribution developing in them as accurately as possible, in order to avoid damagings overheating and to establish optimum temperature conditions.

In the study of the thermal conditions in composite constructions (machines, pieces of equipment, buildings etc.) the interaction of the individual elements must necessarily be considered, that is, composite constructions must be modelled and described as thermal systems.

The purpose of the book is to promote physical and mathematical modelling by presenting novel, efficient methods. The author relies on the fundamental knowledge acquired in studies at universities of technology.

The author first summarizes the theoretical fundamentals of heat transfer processes and subsequently the heat transfer processes themselves. In the first part he discusses heat flow net methods. It is a great benefit of the mode of discussion that the author not only starts the mathematical solutions, but to promote practical application, he carries them out to the end. In this part of the book, graph matrix handling and solution of heat flow nets should be emphasized: this method has never yet been discussed in such detail and so completely in books of this type. The train of ideas will be most accessible to engineers with electrical engineering training.

In the part Finite Difference Methods, this method is applied to determine temperature distributions. After outlining the theoretical fundamentals, the author discusses one-, two- and three-dimensional temperature distributions both steady in time and varying in time. In order to increase the potentials of practical applications, the stability problem of the solutions is treated in detail: a separate chapter deals with the derivation of difference schemes having more favourable stability properties.

Discussion of Finite Elements Methods is introduced by the derivation of finite time element schemes. He points out how the system of equation of heat flow nets can be transiently solved by means of finite element time schemes. The methods based on weighted residues and on variation principles are dealt with in detail, as well as the finite-element formulation of the various one- two- and three-dimensional, steady-state and transient heat conductivity problems for linear and non-linear cases.

Finally the author compares the finite element methods with the finite difference methods and presents very valuable and useful information on the application potentials of the two basic methods.

In the appendix, the author assists the reader to get acquainted with or refresh fundamental notions indispensable for efficient reading of the book.

At the end of each part — in some cases several times within one part — very rich literature references promote serviceability.

The book is complemented by attentively compiled name and subject indexes.

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