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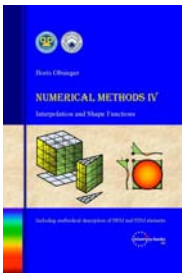

Boris Obsieger

NUMERICAL METHODS IV
Interpolation and Shape Functions

Including methodical description of BEM and FEM elements

Textbook at several universities
International edition in English

Chapters:

Numerical Methods IV – Interpolation and Shape Functions

Description:

An excellent textbook established at several universities. Primarily written for students at technical universities, it is also a very useful handbook for engineers, PhD students and scientists. Available in several forms at all continents

Approved by the University of Rijeka, Croatia, 2012-12-14.
Approved by the Faculty of Engineering in Rijeka, Croatia, 2012-11-30.

Approved and recommended by the Moscow State Industrial University, Russia, 2013-10-11.

University of Maribor
Faculty of Logistics

Approved for the study programs on the international basis by the Faculty of Logistic in Celje, Slovenia, 2013-10-11.

This textbook introduces the reader into various interpolation methods. It describes various interpolation methods. The interpolation domain is usually divided into interpolation elements, such as finite elements and boundary elements. Interpolation on these elements is provided by shape functions, which are systematically defined in global and local coordinates by using null-points, null-lines or null-planes.

The book is divided into seven chapters. The first chapter explains briefly the background of interpolation theory. The difference between simple interpolation methods and higher level interpolation methods is explained, as well as two kinds of interpolation formulas which use coordinate and shape functions.

The second chapter describes various polynomial interpolation methods. It is also shown how Chebyshev polynomial interpolation may suppress Runge's phenomenon and reduce an interpolation error. In the third chapter, non-polynomial methods (exponential, logarithmic, and rational) are discussed. These methods are important if the interpolation is performed over the semi-infinite or infinite domain, while Fourier's interpolation should be used if the interpolation function is periodic.

Piecewise interpolation with one dimensional interpolation elements and splines are described in the fourth chapter. Interpolation on triangular and rectangular elements, as well as construction of their shape functions are described in the fifth and sixth chapter. Finally, volume interpolation elements (tetrahedral, prismatic and cube elements) are described in the seventh chapter.

Practical applications are supported by 10 algorithms and 43 examples. Beside its practical usage, the given text with 131 figures and 26 tables represents a valuable background for understanding, developing and applying various numerical methods. Described interpolation elements can be used easily in the finite and boundary element methods.

Editions:

This textbook is written in English
Several colour and black & white editions are available.

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