

1. Record Nr.	UNINA9910796663003321
Autore	Khoromskij Boris N.
Titolo	Tensor numerical methods in scientific computing // Boris N. Khoromskij
Pubbl/distr/stampa	Berlin ; ; Munich ; ; Boston : , : De Gruyter, , [2018] ©2018
ISBN	3-11-039139-2 3-11-036591-X
Descrizione fisica	1 online resource (382 pages)
Collana	Radon Series on Computational and Applied Mathematics ; ; 19
Disciplina	515.63
Soggetti	Calculus of tensors
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Frontmatter -- Contents -- 1. Introduction -- 2. Theory on separable approximation of multivariate functions -- 3. Multilinear algebra and nonlinear tensor approximation -- 4. Superfast computations via quantized tensor approximation -- 5. Tensor approach to multidimensional integrodifferential equations -- Bibliography -- Index
Sommario/riassunto	The most difficult computational problems nowadays are those of higher dimensions. This research monograph offers an introduction to tensor numerical methods designed for the solution of the multidimensional problems in scientific computing. These methods are based on the rank-structured approximation of multivariate functions and operators by using the appropriate tensor formats. The old and new rank-structured tensor formats are investigated. We discuss in detail the novel quantized tensor approximation method (QTT) which provides function-operator calculus in higher dimensions in logarithmic complexity rendering super-fast convolution, FFT and wavelet transforms. This book suggests the constructive recipes and computational schemes for a number of real life problems described by the multidimensional partial differential equations. We present the theory and algorithms for the sinc-based separable approximation of the analytic radial basis functions including Green's and Helmholtz kernels. The efficient tensor-based techniques for computational problems in electronic structure calculations and for the grid-based

evaluation of long-range interaction potentials in multi-particle systems are considered. We also discuss the QTT numerical approach in many-particle dynamics, tensor techniques for stochastic/parametric PDEs as well as for the solution and homogenization of the elliptic equations with highly-oscillating coefficients. Contents Theory on separable approximation of multivariate functions Multilinear algebra and nonlinear tensor approximation Superfast computations via quantized tensor approximation Tensor approach to multidimensional integrodifferential equations
