



## PREFACE: APPROXIMATION THEORY AND RELATED TOPICS

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This special issue on Approximation Theory and Related Topics is dedicated to Professor Ronald A. DeVore on the occasion of his 80th birthday.

Ronald A. DeVore is an outstanding American mathematician who has made significant contributions to many areas of applied mathematics such as numerical analysis of partial differential equations, machine learning algorithms, approximation of functions, wavelet transforms, statistics, and the theory of compressed sensing. He received a B.S. from Eastern Michigan University in 1964 and a Ph.D. in mathematics from Ohio State University in 1967 under the supervision of Ranko Bojanic. From 1968 to 1977 he was at Oakland University. In 1977 he became a professor at the University of South Carolina, where he served as the Robert L. Sumwalt Professor of Mathematics from 1986 to 2005. From 1999 to 2005 he also served as the director of the Industrial Mathematics Institute, which he had founded. In 2005 he retired from the University of South Carolina. Since 2008 he has been the Walter E. Koss Professor at Texas A&M University and was named Distinguished Professor in Fall 2010. He was the advisor of nine PhD students and published three books and over 210 papers.

DeVore's work was widely recognized, including an Alexander von Humboldt Fellowship from 1975 to 1976, the Journal of Complexity Outstanding Paper Award in 2000, the Bulgarian Gold Medal of Science in 2001, the Humboldt Prize in 2002, the ICS Hot Paper Award in 2003, an Honorary Doctorate from RWTH Aachen University in 2004, and the SPIE Wavelet Pioneer Award in 2007. He was also a plenary lecturer at the International Congress of Mathematicians in 2006. In 2001 he became a member of the American Academy of Arts and Sciences, and in 2007 he became a member of the Bulgarian Academy of Sciences. In 2012 he became a fellow of the American Mathematical Society. From 2000 to 2002 he was the Chair of the Society for the Foundations of Computational Mathematics (FOCM). In 2017 he was elected to the National Academy of Sciences and was named a SIAM Fellow in 2018.

In this special issue we present papers authored by a selected group of experts in the areas of Approximation Theory. Most of the papers collected here have been contributed by former students, collaborators, friends and colleagues of Ronald DeVore, who were influenced by his scientific work. The special issue contains eighteen papers contributed by researchers in Approximation Theory from China, Croatia, France, Germany, Hungary, Morocco, Poland, Russia, Singapore, Spain, Turkey, and USA. These papers cover a wide spectrum of important problems and topics of current research interest, including approximation by tree tensor networks in high dimensions, fast change-of-bases in polynomial interpolation, anisotropic

Besov regularity of parabolic PDE's, locality of harmonic generalized barycentric coordinates and their applications, weighted statistical approximation properties of Jain-Markov operators, unrestricted (random) products of projections in Hilbert space, a refinement of Marcinkiewicz-Zygmund type inequalities in  $L^q$ ,  $q > 0$ , greedy search of optimal approximate solutions, approximation and quadrature by weighted least squares polynomials on the sphere, the entropy numbers and the Kolmogorov widths, long time and large crowd dynamics of fully discrete Cucker-Smale alignment models, universal sampling representation, zeros of Chebyshev polynomials on Jordan curves, a relaxation argument for optimization in neural networks and non-convex compressed sensing, a new definition of fractional derivatives, multi-level Markov chain Monte Carlo for Bayesian inverse problems, learning from a single solution of a PDE, and time-limited Toeplitz operators on abelian groups.

Therefore we feel that this special issue will be highly important for many mathematicians, who are interested in recent developments in Approximation Theory, as well as in its numerous applications.

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