Special Volume

Dedicated to Walter Gautschi on the occasion of his 90th birthday

The international conference "Approximation and Computation – Theory and Applications" (ACTA 2017) was jointly organized by the Serbian Academy of Science and Arts (SASA), the University of Belgrade (Faculty of Mechanical Engineering, Faculty of Mathematics, and School of Electrical Engineering), the University of Niš (Faculty of Sciences and Mathematics), the University of Kragujevac (Faculty of Science), the University of Novi Sad (Faculty of Sciences), and the Mathematical Institute of SASA. The conference was held in Belgrade, Serbia, November 30–December 2, 2017. The aim of ACTA 2017 was to bring together leading scientists of the international numerical and applied mathematics community and young researchers from all over the world working in mathematics and its applications to present their research, exchange new ideas, discuss challenging issues, and to foster future collaborations. Five plenary speakers and more than 60 participants from 12 countries attended the conference and presented their research results.

The conference was dedicated to Walter Gautschi, one of the the world leading experts in the fields of numerical analysis, special functions, and approximation theory, to celebrate his 90th birthday.

Walter Gautschi was born on December 11, 1927 in Basel, Switzerland. In 1953 he received his Ph.D. degree from the University of Basel with a thesis on graphical integration of ordinary differential equations, under supervision of Alexander Ostrowski. Soon after his Ph.D. exam, Walter Gautschi spent a year at the National Institute for Application and Computation (Istituto Nazionale per le Applicazioni del Calcolo) in Rome. From there he moved to the United

States. Gautschi first went to the Harvard Computation Laboratory and subsequently joined the staff of the Computation Laboratory at the National Bureau of Standards in Washington, D. C. (now called the National Institute of Standards and Technology). There Gautschi developed a number of computer algorithms for evaluating special functions, for example, for the gamma and incomplete gamma functions, and Bessel functions of the first kind. He also carried out theoretical work on special functions.

Gautschi started his permanent academic career in 1963 by accepting a professorship at the Department of Computer Sciences and the Department of Mathematics at Purdue University. In the beginning of the 80's, Walter Gautschi developed the *constructive theory of orthogonal polynomials* on the real line, including effective algorithms for numerically generating orthogonal polynomials with respect to an arbitrary measure, and provided rigorous and detailed stability analyses of these algorithms. Gautschi also developed several new applications of orthogonal polynomials. Moreover, he wrote and made available the software necessary for implementing these algorithms. The algorithms implement the method of (modified) moments, the discretized Stieltjes–Gautschi procedure, and the Lanczos algorithm. Gautschi's contributions opened the door for extensive work on orthogonal polynomials and their applications in diverse areas of applied and numerical analysis, including numerical integration, interpolation processes, integral equations, moment-preserving spline approximation, and the summation of slowly convergent series.

Gautschi had 8 Ph.D. students. He retired from Purdue University in 2000 with the title of Professor Emeritus, but both his research and lecturing activities have continued unabatedly ever since.

In 2001, Walter Gautschi was elected a Foreign and Corresponding Member of two European Academies, the Bavarian Academy of Sciences in Munich and the Turin Academy of Sciences. He was named a SIAM Fellow in 2012. Walter has published 4 books, 34 book chapters, 170 refereed journal papers, 7 refereed papers in conference proceedings, translated 3 books, and edited 5 conference proceedings.

Walter Gautschi is one of the founders of modern numerical analysis. His

research covers a wide range of topics including ordinary differential equations, linear difference equations, interpolation and approximation, special functions, orthogonal polynomials, quadrature processes, and the history of mathematics. Contributions of Walter Gautschi have had a significant impact on the field; his papers are widely cited. They are characterized by their clarity of exposition and will remain excellent resources for researchers in the field for many years to come.

This special volume of ETNA is dedicated to Walter Gautschi. It contains selected papers contributed by friends and colleagues from the international scientific computing community. Some of the papers were presented at ACTA 2017.

Gradimir V. Milovanović
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Special volume editors