Excerpt from OP-SF Net

Topic #4 OP - SF Net 25.1 January 15, 2018

From: Walter Van Assche (walter.vanassche@kuleuven.be)
Subject: Report on: ACTA 2017 in Belgrade, Serbia, by Van Assche

An international conference *Approximation and Computation – Theory and Applications* (ACTA 2017) was held in Belgrade, Serbia from November 30 to December 2, 2017. This conference was dedicated to Walter Gautschi on the occasion of his 90th birthday. Walter Gautschi and his wife Erika were both present and he actively participated in the conference. Walter Gautschi is very well known in our community of Orthogonal Polynomials and Special Functions and is one of the leading scientists in the field of numerical analysis and approximation. He was professor at Purdue University since 1963 (now emeritus).

The first day was held at the Serbian Academy of Sciences and Arts in a historic building with a very nice lecture room. After the official opening, Gradimir Milovanović gave an overview of Walter Gautschi's work and described him as a *master in approximation and computation*. Walter Gautschi then gave some reflections on his career and called it *progress by accident*. Miodrag Spalević went on to describe *Walter Gautschi's relation with the Serbian school of numerical integration*. The remainder of the day was filled with plenary talks by five international speakers. I gave a talk on *Multiple Hermite polynomials and simultaneous quadrature* because I knew that Walter Gautschi has a keen interest in numerical quadrature and some people from the Serbian school of numerical integration have recently done some work on the computation of nodes and weights for simultaneous quadrature. In the afternoon Martin Gander (University of Geneva) talked about *Five decades of time parallel time integration: best current methods for parabolic and hyperbolic problems*, related to Gautschi's earlier work on numerical methods for differential equations. Next, Paco Marcellán (Universidad Carlos III de Madrid) talked about *Orthogonal polynomials, Geronimus transformations and quadrature rules*. Sotirios Notaris (National and Kapodistrian University of Athens) talked on *Gauss-Kronrod quadrature: Recent advances and open questions*. Soririos Notaris is a former PhD student of Gautschi with a PhD at Purdue University in 1988. The last speaker of the day was Lothar Reichel (Kent State University, Ohio) with a talk on *Generalized anti-Gauss-type quadrature rules*. I was quite happy to see he was also using simultaneous quadrature but for discrete weights.

The next two days of the conference were held at the Faculty of Mechanical Engineering of the University of Belgrade. There were talks by participants from 12 countries and many talks by young researchers from Serbia. Giuseppe Mastroianni and his (female) colleagues from the University of Basilicata in Italy (Donatella Occorsio, Incoronata Notarangelo, Maria Carmela De Bonis, and Concetta Laurita), talked about polynomial approximation and applications in integration rules for hypersingular integrals, Nyström's method for Fredholm integral equations other integro-differential equations. Walter

Gautschi himself gave a talk on *Binet-type polynomials and their zeros* where he recalled Markov's theorem about the monotic behavior of zeros of orthogonal polynomials, which he applied to orthogonal polynomials with a special weight function. Ramon Orive (Universidad de La Laguna, Tenerife) talked about minimax approximation, Yilmaz Simsek (Akdeniz University, Turkey) manipulated several generating functions for special polynomials, and various people explained their work on finite-difference schemes for various differential equations. Since some of the talks were in parallel sessions, I was unable to attend all the talks and had to make a selection, where I usually decided to follow the talks that had titles that sounded familiar or at least not frightening. This unfortunately made me miss a talk by Katica Stevanović Hedrih about *Approximations in vibro-impact dynamics of rolling bodies in successive central collisions on a curvilinear trace*, which I later was told was quite interesting and entertaining.

On Saturday we also had the opportunity to visit the Nikola Tesla museum. This is highly recommended to anyone visiting Belgrade. It started with a short movie explaining Tesla's life and achievements, and then there were some exciting experiments with all sorts of electric generators, lightnings, remotely controlled boats, and lamps. The museum has a number of original items of Nikola Tesla, like books, letters, clothes, etc.

The organizers did a very good job running this conference and the level of speakers and the high quality results surely made this a useful conference and I am pretty sure that Walter Gautschi was very pleased with this scientific token of appreciation of his work and career.

Trivia:

• Walter Gautschi was born on December 11, 1927 in Basel, Switzerland.

• Walter had a twin brother Werner, who passed away on October 3, 1959 in Basel.

• Selected works of Walter (and Werner) Gautschi are published by Birkhäuser in their Contemporary Mathematicians series (http://www.springer.com/gp/book/9781461470335). The three volumes are edited by Claude Brezinski and Ahmed Sameh and contain a selection of papers with commentaries by 12 scientists.

• According to MathSciNet, Walter Gautschi has 198 publications (as of December 6, 2017), and this doesn't include his latest paper *Polynomials orthogonal with respect to cardinal B-spline weight functions* in Numerical Algortihms, Volume 76, Issue 4, pp. 1099–1107 (December 2017).

• Walter Gautschi has written 3 books:

1. Numerical Analysis: An Introduction, Birkhäuser, Boston, 1997 (2nd edition 2012).
2. Orthogonal Polynomials: Computation and Approximation, Numerical Mathematics

and Scientific Computation, Oxford University Press, 2004.
3. Orthogonal Polynomials in MATLAB: Exercises and Solutions, SIAM, Philadelphia, 2016.

One more book will appear soon (by SIAM as an e-book only) about his software repository for orthogonal polynomials.

• Walter Gautschi was involved in two chapters for the Handbook of Mathematical Functions (edited by M. Abramowitz and I. A. Stegun): the chapter *Exponential integral and related function* (which he wrote with William F. Cahill) and the chapter *Error function and Fresnel integrals* (which he wrote alone).

• Walter was also involved in Louis de Branges' proof of the Bieberbach conjecture. He verified (numerically) some essential inequalities and called Richard Askey to find out whether these inequalities were known. Within one day Askey confirmed that the inequalities were true and they were proved in his paper with George Gasper.