EDITORIAL

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In memory of Professors Radim Blaheta and Ivo Marek.

Seminar on Numerical Analysis 2021 (SNA'21) was virtually held on January 25–29, 2021, and organized by the Institute of Geonics (IGN) of the Czech Academy of Sciences. It was the 15th meeting in the series of SNA events. The previous meetings were held in Ostrava 2003, 2005, Monínec 2006, Ostrava 2007, Liberec 2008, Ostrava 2009, Nové Hrady 2010, Rožnov 2011, Liberec 2012, Rožnov 2013, Nymburk 2014, Ostrava 2015, 2017, and 2019. SNA events help to join the Czech research community working in the field of numerical mathematics and computer simulations. The scope of the seminar ranges from mathematical modeling and simulation of challenging engineering problems to methods of numerical mathematics, numerical linear algebra, and high-performance computing.

First of all, we would like to briefly remember two of the key persons of SNA events, Professors Ivo Marek (1933–2017) and Radim Blaheta (1951–2022). More information about them can be found in [1], [2].

Ivo Marek, Professor at Charles University and the Czech Technical University in Prague, was for many decades one of the best-known Czech mathematicians, who contributed significantly to the development of computational methods and numerical analysis. At the same time, he was an excellent teacher. The first SNA event was organized on the occasion of Ivo's seventieth birthday. Ivo was then a member of the Program Committee for other SNA events till 2017.

Radim Blaheta, Ivo's student, was a well-known researcher, the head of the mathematical department and the director of IGN. At the same time, he was Professor at the VŠB–Technical University of Ostrava. Radim was interested in numerical mathematics, computer sciences, geotechnical and environmental real-world problems and other scientific disciplines. He was an excellent organizer of many national and international scientific events. In particular, he was a co-founder of SNA and the main organizer of all the events held in Ostrava or Rožnov pod Radhoštěm.

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Ivo and Radim also had a very cordial and warm social style and were very good friends as is documented in Figure 1. These facts have significantly influenced the atmosphere of SNA events. Both of them received the Bernard Bolzano Honorary Medal for Merit in the Mathematical Sciences provided by the Czech Academy of Sciences and many other awards.

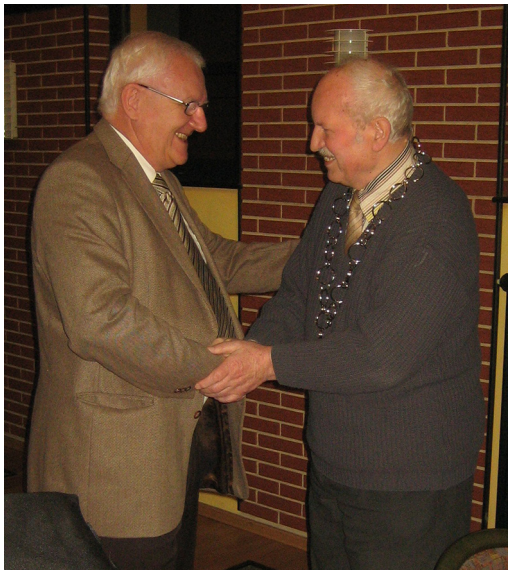

Figure 1. Radim Blaheta and Ivo Marek—the seminar SNA'13 in Rožnov pod Radhoštěm celebrating the eightieth birthday of Ivo Marek.

Radim also started to organize SNA'21. Unfortunately, he was severely affected by covid-19 at the end of 2020 and could not participate in this seminar. He struggled with post-covid complications till 20th January 2022 when he passed away. Due to the covid pandemics, the seminar also could not be organized in a traditional in-person form.

SNA'21 had about 80 on-line participants. Its programme included the traditional Winter School with the following tutorial lectures:

- ▷ Regularization of large discrete inverse problems by iterative projection methods (*I. Hnětynková*),
- ▷ Asynchronous iterative methods (*F. Magoulès*),
- ▷ On the algebraic error in numerical solution of partial differential equations (*J. Papež*),
- ▷ Iterative solvers for the stochastic Galerkin method (*I. Pultarová*),

and about 25 contributions in the form of short presentations. On the other hand, due to holding it online, there were more participants from abroad.

This special issue of Applications of Mathematics contains 7 papers related to selected talks presented at SNA'21 and edited by Miroslav Rozložník, Stanislav Sysala and Petr Tichý. Their brief description is listed below.

G. Gbikpi-Benissan and F. Magoulès introduce the application of asynchronous iterative methods within the framework of the primal Schur domain decomposition method. Numerical experiments are conducted on a supercomputer for both Poisson's and linear elasticity problems.

V. Janovský applies numerical continuation and isotropy groups to analyze patterns in a reaction-diffusion systems. Using this approach the bifurcation diagrams are obtained. The results are supposed to be interesting for numerous researchers working in the area of diffusion-driven instabilities.

B. Sousedík, H. C. Elman, K. Lee, and R. Price study linear stability of solutions to the Navier-Stokes equations with stochastic viscosity. The authors compare three surrogates for the parametric eigenvalues based on stochastic collocation, Gaussian process regression, and shallow neural network. The surrogates are compared to Monte Carlo simulations for two benchmark test problems.

J. Egermaier and H. Horníková present a numerical study that deals with the optimal choice of the parameter γ for the augmented Lagrangian preconditioning of the GMRES method for solving linear systems obtained from the discretization of incompressible Navier-Stokes equations. In particular, the authors consider various problem parameters and various isogeometric discretizations, and study the influence of the parameter γ on convergence of the corresponding linear solver.

H. Štekbauer, I. Němec, R. Lang, D. Burkart, and J. Vala focus on the solution of a dynamic contact problem of elastic bodies by an explicit time discretization and by the finite element method. A computational algorithm for determination of contact forces is suggested such that the conservation of energy and momentum is preserved. The algorithm is compared with the penalization method on numerical examples.

B. Bastl, M. Brandner, K. Slabá, and E. Turnerová consider numerical simulation of turbulent flows which plays an important role in many applications. The paper covers a wide range of topics ranging from the modelling over the weak formulation, discretization based on isogeometric analysis till the discussion of stabilization techniques. A new stabilization method is proposed and successfully compared with other methods known from literature.

C. Matonoha, Š. Papáček, and V. Lynnyk focus on a family of model reduction methods applied to a chemical network modeled by a system of nonlinear ordinary differential equations. The classical quasi-steady-state approximation (QSSA) method is compared to the recent delayed-QSSA approach, which is further enhanced by the authors by choosing the optimal delay. Both theoretical and numerical issues related to the setting of delays are discussed.

We would like to thank to all contributing authors for their interest to publish in Applications of Mathematics. Let us also thank the anonymous referees for their expert opinions and recommendations.

References

[1] *R. Blaheta, M. Tůma*: Professor Ivo Marek (1933–2017). Appl. Math., Praha *62* (2017), 719–721. zbl MR doi

[2] *S. Sysala*: Laudation for the 70th birthday of Professor Radim Blaheta. Math. Comput. Simul. *189* (2021), 3–4. zbl MR doi

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