EDITORIAL

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This special issue of *Applications of Mathematics* is published on the occasion of the conference Programs and Algorithms of Numerical Mathematics 18 held in June 19–24, 2016 in Janov nad Nisou, Czech Republic. It was already the eighteenth meeting in this traditional series of conferences organized by the Institute of Mathematics of the Czech Academy of Sciences since 1983. Programs and Algorithms of Numerical Mathematics (PANM) have regularly attracted a major part of the Czech community of computationally oriented mathematicians ranging from theoretical numerical analysts to engineers solving real-world problems. Traditionally, this conference hosts a significant number of young researchers, PhD students, and even several undergraduate students. Topics of PANM include both theoretical and practical aspects of numerical methods, algorithms, computer programs, numerical modelling, and parallel computing. The conference was attended by 54 participants, who presented five invited talks, three review talks, 32 short communications, and seven posters.

The current issue of Applications of Mathematics contains five papers presented at the conference. They all emphasize the theory of numerical methods rather than engineering applications. The contribution of Martin Plešinger, Iveta Hnětynková, and Jana Žáková deals with the truncated total least squares methods for linear data fitting problems. This method is used also for very ill-conditioned, rank-deficient, and ill-posed problems. It is well known that the solution of this problem can be expressed by a filtered pseudoinverse of the given matrix using the so-called filter factors. The authors prove that this result can be generalized to the case of multiple right-hand sides. It is a nontrival result and the corresponding filter factors are explicitly derived.

The paper of Ladislav Lukšan and Jan Vlček proposes a new quasi-Newton update for solving systems of nonlinear equations. They prove convergence and other properties of this modification and provide extensive results of numerical experiments that confirm superiority of this method over other quasi-Newton methods.

Miloslav Vlasák presented at the PANM 18 conference an excellent review talk on numerical methods for systems of ordinary differential equations. He was explicitly asked to prepare a written review and the resulting 33 pages long paper uses a linear parabolic equation as a model problem to survey existing methods and the corresponding theory of stability for stiff ordinary differential equations. On top of it, this paper nicely describes the connection of implicit Runge-Kutta methods to collocation and Galerkin methods.

Jiří Hozman and Tomáš Tichý present an advanced discontinuous Galerkin method for efficient numerical solution of the Black-Scholes partial differential equation describing the price of multi-asset Asian options with floating strike. The authors introduce the concept of the dimensionality reduction with respect to the payoff, which transforms the originally three dimensional problem to two dimensional one.

Finally, the contribution of Roman Knobloch, Jaroslav Mlýnek, and Radek Srb is about the classical differential evolution algorithm. This algorithm tries to solve an optimization problem by evolving a population of solutions. Interestingly, new children solutions have three parents. The authors propose a modification of this algorithm and prove that the modified version converges to a global solution in probability.

Let me use this opportunity to thank all contributing authors for accepting the invitation to publish their results in this special issue. Let me also thank the anonymous referees for their expert opinions, recommendations for improvements, and for keeping strict deadlines such that this issue can be published with no delay. Further, I would like to thank my colleagues from the organizing committee of PANM 18, namely Jan Chleboun, Pavel Kůs, Petr Přikryl, Karel Segeth, and especially Jakub Šístek, who carried the main organizational burden. Many thanks are due to Jan Brandts, the editor in Chief of Applications of Mathematics, for all the hard work he has devoted to this journal and for accepting our proposal for this special issue. Finally, let me express my gratitude to the editorial office of Application of Mathematics, namely to the executive editor Eva Ritterová, for her professional approach and tireless effort in order to guarantee smooth and timely production of this special issue.

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