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Editorial

Applications of Mathematics, Vol. 64 (2019), No. 2, 101–102

Persistent URL: http://dml.cz/dmlcz/147660

EDITORIAL

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This special issue of *Applications of Mathematics* is devoted to the conference Programs and Algorithms of Numerical Mathematics 19 (PANM 19) held in June 24–29, 2018 in Hejnice, Czech Republic. PANM 19 was already the nineteenth meeting in the traditional PANM series of conferences organized by the Institute of Mathematics of the Czech Academy of Sciences since 1983. Even this time the conference attracted a major part of the Czech community of computationally oriented mathematicians ranging from theoretical numerical analysts to engineers solving real-world problems. Topics of PANM include theoretical and practical aspects of numerical methods, algorithms, computer programs, numerical modelling, and parallel computing. The conference was attended by 62 participants, who presented eight invited talks, 32 short communications, and 12 posters.

This special issue contains six papers presented at the conference. Three of them concern the theory of numerical methods and the other three are inspired by particular real life applications and emphasize more practical aspects.

Iveta Hnětynková, Martin Plešinger, and Jana Žáková consider the linear approximation problem $AX \approx B$ solved by total least square minimization (TLS). However, this TLS problem is not solvable in general. The authors use the so-called core problem to analyze this phenomenon and provide full classification of core problems with respect to their solvability.

Ondřej Bartoš, Miloslav Feistauer, and Filip Roskovec analyze the finite element discretization of an elliptic problem with a nonlinear Newton boundary condition in a polygonal domain with a special emphasis on the effect of quadrature errors. Their analysis is thorough and includes a number of results about the problem itself, about the finite element discretization, about the corresponding order of convergence, and mainly about error estimates for the case of inexact numerical integration.

Petr Stehlík and Jonáš Volek study the existence and (non)uniqueness of solutions of one dimensional Nagumo reaction-diffusion equation discretized by finite differences on a regular grid (lattice). Using the eigenvalues of the resulting Laplacian

DOI: 10.21136/AM.2019.0048-19

matrix they obtain conditions for the existence, uniqueness, and nonuniqueness of the discrete solution in various cases.

Petr Salač and Jan Stebel are inspired by a technical problem of pressing glass products and solve a shape optimization problem of the plunger cooling cavity for a time dependent model. It is a coupled problem of heat transfer and fluid flow. They rigorously formulate the complex shape optimization problem, define the weak solution, and prove its existence and uniqueness.

Jan Valášek, Petr Sváček, and Jaromír Horáček aim at the modelling of human vocal fold in a glottal channel. They consider the fluid-structure interaction problem of an incompressible fluid and elastic body described by the Navier-Stokes equations in the arbitrary Lagrangian-Eulerian form and a linear elasticity equation. They propose a promising physically relevant inlet boundary condition useful especially if the channel is closing.

Jurjen Duintjer Tebbens, Ctirad Matonoha, Andreas Matthios, and Štěpán Papáček are inspired by designing patient-tailored dosing regimens of drugs. In particular, they study rifampicin-induced CYP3A4 enzyme production and compare an existing model with their own experimental data. Realizing a bad fit to these data, they rigorously analyze the model and found that a very good fit could be achieved by doubling one of the originally reported parameter values.

Personally, I wish to thank all contributing authors for publishing their results in this special issue. Many thanks are due to anonymous referees for their difficult but extremely important role in the peer-review process. Further thanks are due to Vít Dolejší, the editor in Chief of Applications of Mathematics, for accepting the proposal for this special issue. The last but not least thanks go to the editorial office of Application of Mathematics, namely the executive editor Eva Ritterová, for her great assistance in order to guarantee smooth and timely production of the issue.

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