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Editorial

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EDITORIAL

MIROSLAV ROZLOŽNÍK, MILAN HLADÍK, Praha

This editorial introduces two volumes of Applications of Mathematics devoted to the MatTriad 2019 conference. The conference was held in Liblice, Czech Republic, between 8th and 13th September 2019, and it was organized jointly by the Institute of Mathematics, Czech Academy of Sciences, and the Faculty of Mathematics and Physics, Charles University, Prague. It was a registered satellite meeting of ICIAM 2019 and also recognized as an ILAS-Endorsed Meeting.

The scope of the conference is traditionally focused on various aspects of matrix theory such as numerical linear algebra, applications of linear algebra in statistics and statistical models, matrices and graphs as well as interval computations, optimization and reliable computing. The format of the meeting involves plenary sessions, special sessions and sessions with contributed talks. There were four special sessions organized: Total positivity, Tropical matrix algebra and its applications, Recent developments of verified numerical computations, and Interval matrices. MatTriad 2019 was attended by 91 participants, including six invited plenary speakers and two recipients of the Young Scientist Award from MatTriad 2017. Two participants Marie Kubínová and Yuki Nishida became the new winners of the Young Scientist Award and they will be invited as plenary speakers for MatTriad 2021.

The special issue of Applications of Mathematics contains fifteen papers divided into two volumes. The first volume consists of eight papers, and it begins with a historical perspective *Beyond the MatTriad conferences*, written by Jan Hauke, Augustyn Markiewicz and Simo Puntanen. At the meeting Shmuel Friedland delivered two invited lectures as The Hans Schneider ILAS Lecturer. In his paper *The Collatz-Wielandt quotient for pairs of nonnegative operators*, two versions of the Collatz-Wielandt quotient are considered, that map a given pointed generating cone in the first space into a given pointed generating cone in the second space including a characterization of minimal optimal solutions and their polynomially computable bounds. The paper of Balaji Ramamurthy, Ravindra Bhalchandra Bapat and Shi-

vani Goel with the title *Distance matrices perturbed by Laplacians* is devoted to the study of their interesting properties. Israel Rocha in his paper *Partial sum of eigenvalues of random graphs* investigates this quantity and gives its bounds within a given range in terms of the number of edges. The papers *Interval matrices with Monge property* by Martin Černý and *Complexity of computing interval matrix powers for special classes of matrices* by David Hartman and Milan Hladík contributed to the area of interval computation, represented by the special session of Interval matrices. Gokulraj Sengodan and Chandrashekar Arumugasamy contributed to the area of optimization. In particular, they generalized the concept of an equilibrium in bi-matrix games to bi-linear games in their paper *Linear complementarity problems and bi-linear games*. The paper *Convergence acceleration of shifted LR transformations for totally nonnegative Hessenberg matrices* by Akiko Fukuda, Yusaku Yamamoto, Masashi Iwasaki, Emiko Ishiwata and Yoshimasa Nakamura gives insight into convergence of the LR algorithm and its acceleration by using the Newton shift.

The second volume consists of seven papers. Four of them are devoted to tropical algebra, discussed in the special session of Tropical matrix algebra and its applications. In particular, María Jesús de la Puente and Pedro Luis Clavería introduced a novel type of centrally symmetric polytopes in *Isocanted alcoved polytopes* by means of tropical normal idempotent matrices. Any Muanalifah and Sergeĭ Sergeev in *Modifying the tropical version of Stickel's key exchange protocol* investigated simple and generalized attacks and their applications to the proposed protocols. Nikolai Krivulin considered two-sided vector inequalities and addressed the corresponding computational issues in his paper *Complete solution of tropical vector inequalities using matrix sparsification*. The paper *Optimization problem under two-sided $(\max, +)/(\min, +)$ inequality constraints* by Karel Zimmermann deals with optimization problems, in which the feasible set is characterized by $(\max, +)$ -linear functions on one side and $(\min, +)$ -linear functions on the other side. The paper *On the vectors associated with the roots of max-plus characteristic polynomials* by Yuki Nishida, Sennosuke Watanabe and Yoshihide Watanabe is also related to tropical algebra, discussing the eigenvalue problem in the (\max, plus) algebra. Stefano Pozza and Pierre-Louis Giscard in their paper *Lanczos-like algorithm for the time-ordered exponential: The $*$ -inverse problem* prove the existence of $*$ -inverses for a certain class of bivariate functions and as a corollary they partially solve the Green's function inverse problem. The last and by no means the least paper in this collection is *Block matrix approximation via entropy loss function* by Malwina Janiszewska, Augustyn Markiewicz and Monika Mokrzycka, presenting a procedure of approximation of a symmetric positive definite matrix by symmetric block partitioned matrices with structured off-diagonal blocks.

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