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EDITORIAL
A SPECIAL ISSUE ON OPTIMIZATION AND RELATED TOPICS DEDICATED TO PROFESSOR ROMAN POLYAK

Roman Polyak is a well-known Russian-American mathematician who has made significant contributions to the fields of Optimization. Professor Polyak received the B.Sc. and the M.S. (honors) in mathematics and physics in 1960 and the Ph.D from Moscow Central Institute of Mathematics and Economics at the USSR Academy of Sciences in 1966. He was a Senior Research Fellow at the Research Institute of Planning at the National Board of Planning in Kiev, the USSR. After emigration from the former Soviet Union in 1988, he was a visiting scientist at the Mathematical Sciences Department at the T.J. Watson Research Center IBM. He was a principal investigator of a joint IBM and NASA study "Optimization in Structural Design." In 1993, Professor Polyak joined the faculty of George Mason University. Since 1995, he is a full professor of mathematics and operations research and has a joint appointment at the Mathematical Sciences and Systems Engineering and Operations Research departments.

Roman Polyak's debut in Optimization goes back to the early 60-s, when in collaboration with S. Zuchovitsky and M. Primak he developed, independently on G. Zoutendijk, the method of feasible direction in both Euclidian and Gilbert spaces. In the 60-s, they solved the standardization problem, which leads to the minimization of a concave function on a special poletop. Their method finds the global minimum in polynomial time. In the late 60-s and early 70-s, they developed several methods for finding Nash equilibrium in n-person concave game and the Walras-Wald equilibrium. In the mid-60-s, Roman developed primal-dual methods for convex optimization. In the 80-s, Roman developed the Nonlinear Rescaling (NR) theory and exterior point methods for constrained optimization. The NR theory allows to eliminate the basic drawbacks of the classical Sequential Unconstrained Minimization Technique for Nonlinear Programming (NLP). In particular, his Modified Barrier Functions methods had been used with great success for solving large scale real life NLP problems, including planning radiation therapy, truss topology design, optimal power flow and antenna design. Numerical realization of NR methods requires efficient tools for unconstrained optimization, therefore, Roman introduced Regularized Newton method, established its global convergence for any strictly convex function, which has a minimizer, proved local quadratic convergence and estimated its complexity bound. The NR theory has become the foundation for PENNON - one of the best NLP solvers. Together with his former PhD student Igor Griva, he developed Primal-Dual NR theory and methods that can be considered as an alternative to the Interior Point Methods for NLP. Lately, Roman developed the Nonlinear Equilibrium theory - an alternative to Linear Programming for optimal allocation limited resources.

Professor Polyak is the author and co-author of six monographs and chapters of books and he has published more than sixty papers in peer-refereed academic journals. His area of expertise is Linear and Nonlinear programming (interior-exterior point methods), game theory and mathematical economics. He received the Fulbright Scholarship Award in 2001 for his work on NR theory and applications of the NR methods for solving real life problems. In 2003, he became an IFREE (International Foundation for Research in Experimental Economics) Fellow for his work in Mathematical Economics. He received several NSF and NASA Awards for his work in NLP.

In this special issue, we present papers authored by a selected group of well-recognized experts in the optimization theory. Most of the papers collected here have been contributed by collaborators, friends and colleagues of Roman, who have been influenced by his research. The special issue contains thirteen papers contributed by researchers in Optimization from China, Hong Kong, Israel, Japan, Russia, the USA and Vietnam. These papers cover a wide spectrum of important problems and topics of current research interest in Optimization, including augmented Lagrangian - fast projected gradient algorithm with working set selection for training support vector machines, data-compatibility of algorithms, non-Euclidean proximal methods for convex-concave saddle-point problems, minimax exactness and global saddle points of nonlinear augmented Lagrangians, minimum energy control problem for one class of singularly perturbed systems with input delay, learning incentivization strategy for resource rebalancing in shared services with a budget constraint, optimal control in the traffic flow, clustering methods via optimization methodology, global optimality conditions for D.C. minimization problems with D.C. constraints, weak convergence for relatively nonexpansive mappings and maximal monotone operators in a Banach space, extended Gauss-Newton and ADMM-Gauss-Newton algorithms for low-rank matrix optimization, convergence of relaxed inertial methods for equilibrium problems and convergence of an iterative process generated by a regular vector field.

Therefore, we feel that this special issue will be highly important for many mathematicians and scientists, who are interested in recent developments in optimization, as well as in its numerous applications.

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