

**EDITORIAL OF THE SPECIAL ISSUE DEDICATED TO THE  
INTERNATIONAL WORKSHOP ON APPLIED ANALYSIS AND  
OPTIMIZATION 2019 (IWAAO2019) IN TAICHUNG, TAIWAN**

This volume of *Applied Analysis and Optimization* is devoted to the *International Workshop on Applied Analysis and Optimization 2019* which was held during May 30-31, 2019, at the Research Center for Interneural Computing, China Medical University, Taichung, Taiwan. The International Workshop attracted 27 registered participants for a two-day meeting of lively exchanges and debates.

The workshop reflected the growing research interest in variational analysis and optimization from the theoretical as well as from the application point of view. The aim of the workshop was to discuss recent results in nonlinear analysis, optimization, optimal control and their applications, especially to fixed point theory, optimization and medicine. On the occasion of *IWAAO2019*, the journal *Applied Analysis and Optimization* invited submissions of papers to the special issue. The objective of this special issue is to present advances in different areas of applied analysis and optimization theory, recent results in nonlinear analysis, variational analysis, fixed point theory and corresponding applications, in particular to medicine and biology.

The contributions to this special issue are as follows:

In their paper, *Auwal Bala Abubakar, Abdulkarim Hassan Ibrahim, Abubakar Bakoji Muhammad and Christiane Tammer* deal with a modified Dai-Yuan conjugate gradient method for solving nonlinear monotone operator equations subject to convex constraints. The authors show global convergence and present numerical results of the method for monotone operator equations and image reconstruction problems.

*Der-Chen Chang, Sara Khalil and Bert Wolfgang Schulze* study boundary value problems on manifolds with corners. In their article, the authors extend the methods from “closed” singular manifolds to the case with boundary.

*Kenro Furutani* considers the determinacy of the dimension of the nilpotent Lie group, by restricting to a narrow class of nilpotent Lie groups under a regulation of the volume by choosing a kind of a standard class of lattices. The author gives a report of affirmative examples by considering the class of nilmanifolds and by explicit determination of the residues.

The paper by *Liguo Jiao and Do Sang Kim* is devoted to the study of approximate necessary optimality conditions for certain solutions to a semi-infinite multi-objective optimization problem using advanced tools of variational analysis and generalized differentiation under a limiting constraint qualification. Furthermore, a Wolfe type dual model in an approximate form is formulated and corresponding weak and strong duality theorems are derived.

The paper by *Marcel Marohn and Christiane Tammer* concerns characterizations of efficient points of acceptance sets in mathematical finance. These sets describe regulatory preconditions which have to be fulfilled by financial institution to pass a given acceptance test. A financial position that is not an element of the acceptance set has to take management actions into account to change the current position such that the resulting one is in the acceptance set. These actions are raising new capital and invest it into a basket of eligible assets. Relationships between solutions of this problem and (weakly) efficient points of the acceptance set under a specific cone derived from the economic background are studied.

*Hari Mohan Srivastava Ahmad Motamednezhad and Safa Salehian* introduce a new subclass of the class of normalized analytic and bi-univalent functions in the open unit disk by making use of the general Horadam polynomials. The authors apply the Faber polynomial expansion method to find the upper bounds for the general Taylor-Maclaurin coefficients for functions in this general class of analytic and bi-univalent functions. Furthermore, the authors derive upper bounds for the initial Taylor-Maclaurin coefficients as well as the Fekete-Szeg type inequalities for functions belonging to the class of functions that they introduced.

In his article, *Cemil Tunc* considers a nonlinear delay differential equation of second order. For this delay differential equation, a new boundedness result at infinity including sufficient conditions is shown.

The paper by *Wei Wang* gives a survey on recent progress of quaternionic analysis over the Heisenberg groups: The construction of tangential  $k$ -Cauchy-Fueter complexes and Hartogs' phenomenon for  $k$ -CF functions over the right quaternionic Heisenberg group; the tangential  $k$ -Cauchy-Fueter complexes, Penrose-type integral formula for  $k$ -CF functions and Bochner-Martinelli type formula over the Heisenberg group; quaternionic pluripotential theory over the Heisenberg group including plurisubharmonic functions, the quaternionic Monge-Ampere operator and closed positive currents etc.

We would like to express our deep gratitude to China Medical University for generous support for this workshop. Furthermore, we would like to thank a lot Prof. Der-Chen Chang, Prof. Bert Wolfgang Schulze, Prof. Jen-Chih Yao and all organizers of the workshop for the invitation and for the great hospitality during our stay in Taiwan.

The Guest Editors wish all the readers an interesting, instructive, and inspiring study of the contributions in this special issue.

Christian Gnther, Niklas Hebestreit and Christiane Tammer