



Preface to the 5th Brazil–China Symposium on Applied and Computational Mathematics

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After several postponements due to Covid-19, the 5th Brazil–China Symposium on Applied and Computational Mathematics was held in Dongguan, China, between August 22 and August 24, 2021. The conference was jointly organized both by the Brazilian Society for Applied and Computational Mathematics and by the Chinese Mathematics Society. There were almost 200 participants from academic institutions and industries located in either Brazil or China. The scientific program consisted of 13 plenary talks and 63 contributed talks. The focus areas of the conference included optimization, numerical linear algebra, numerical analysis, industrial mathematics, mathematical modeling and methods, operations research, statistics and its applications, theoretical and numerical partial differential equations, topology, data science, artificial intelligence, deep learning, informatics, and large-scale scientific computing. Representatives from Huawei also introduced some real-world applied mathematics problems that arise in communication.

A memorial session was organized for Brazil’s remarkable applied mathematician Clóvis Caesar Gonzaga, who was an invited plenary speaker, but unfortunately passed away just 9 days before the start of the conference. Professor Gonzaga, born on September 6, 1944, received his Ph.D. in 1973 from the Federal University of Rio de Janeiro, Brazil, under the supervision of Professor Nelson Ortogosa da Cunha. One of his revolutionary results was an $O(n^3L)$ algorithm for linear programming. His remarkable paper “Path-Following Methods for Linear Programming” appeared in *SIAM Review* in 1992. He was a fellow of the Brazilian Academy of Sciences, The World Academy of Sciences, and the Society for Industrial and Applied Mathematics. He received a number of awards including the Khachiyan prize from the INFORMS Optimization Society and the Gran-Cruz of the Brazilian National Order of Scientific Merit. The students that he supervised lead the development of continuous optimization in Brazil.

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This special issue contains the following four high quality papers that emanate from the conference:

1. The paper [1] of Aguiar, Ferreira, and Prudente present an inexact version of the gradient projection method based on a relative error tolerance. Asymptotic convergence and complexity analysis is provided for both a constant step size and an Armijo line search.
2. The paper [2] of Geovani Grapiglia develops two quadratic regularized methods utilizing finite difference gradient approximations. Both forward and central finite differences are considered. The accuracy of the gradients are adjusted dynamically using a nonmonotone acceptance criterion. A complexity bound of $O(n\epsilon^{-2})$ is obtained for an ϵ approximate stationary point, where n is the problem dimension.
3. The paper [3] of Gu, Jiang and Zhang focuses on the Weber problem, which is an important model in the field of facility location. This a a stochastic optimization problem when the future customer demand is uncertain. The paper provides an extended moment-based distributionally robust optimization formulation and a polynomial time solution algorithm.
4. The paper [4] of Ji and Dai studies a variant of the Powell-Symmetric-Broyden updates based on a greedy strategy. An explicit condition-number-free superlinear convergence rate is obtained, while global convergence is achieved within a trust-region framework. A randomized method is also analyzed which selects the search direction randomly from any spherical symmetry distribution.

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