volume 195

mathematical programming with data perturbations

edited by
Anthony V. Fiacco

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about the editors . . .

ANTHONY V. FIACCO is Professor Emeritus of Operations Research and Applied Science at George Washington University, Washington, D.C. From 1960 to 1971, Dr. Fiacco was an Operations Analyst for the Research Analysis Corporation in McLean, Virginia, where he was Project Chairman of a study that pioneered several breakthroughs in nonlinear programming (NLP) methodology. He is the author or coauthor of numerous papers on NLP theory and applications, the coauthor with Garth P. McCormick in 1968 of a Lanchester prize-winning book on barrier and penalty function methodology, and the editor of several books, including *Mathematical Programming with Data Perturbations I and II* (both titles, Marcel Dekker, Inc.). A prominent contributor to the development of computable methods for sensitivity and stability analysis, Dr. Fiacco received the Ph.D. degree 1967 in applied mathematics from Northwestern University, Evanston, Illinois. Since 1979, he has organized, at the George Washington University, the only annual conference completely devoted to sensitivity and stability issues.

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Preface

This volume evolved from a much more modest beginning—an interest in publishing a proceedings of the May 1995 Seventeenth Symposium on Mathematical Programming with Data Perturbation, the 17th conference that I have organized annually at George Washington University. Since I retired from the university on 31 May 1995, after 24 years of service as a professor in the Operations Research Department of the School of Engineering and Applied Science, and since this was to be one of the last such meetings that I would organize, I thought the time for a Symposium-related volume was opportune and submitted a proposal. The publisher then invited me to significantly enlarge the scope of my proposal to include research contributions from authors worldwide. I immediately accepted the more ambitious project, allowing also tutorial expositions, all within the context of mathematical programming with data perturbations. The result is the outstanding collection of papers in this volume, covering a wide spectrum of important topics in the subject area by leading researchers who without exception have conducted cutting-edge research in the respective issues that they address.

I regard this work as my "retirement volume." Much of my professional research effort has been devoted to unifying the incisive and diverse results in sensitivity and stability analysis in mathematical programming, through the annual symposia mentioned and through the publication of books and surveys, particularly edited volumes of multi-authored state-of-the-art contributions. I am grateful to the authors and the publisher for the opportunity to add yet another fine collection of works to the contemporary body of knowledge in this important area.

This book will hopefully contribute to the advancement of the methodology, capturing many of the best known classical results in a modern setting and often as a special case of current results, while introducing several new directions of research. It should serve as a valuable reference for both students and experienced analysts who are looking for authoritative discussions of current results and for new topics of study. Anyone doing serious work in this general area would be well advised to consult this work. Some of the major areas discussed are new characterizations of regularity, the effect of perturbations on the performance of algorithms, the use of approximation techniques to

derive optimality and regularity conditions, strong and weak second-order conditions and attendant first- and second-order differential stability results, duality classification using perturbation techniques, embedding and pathfollowing methods, well-posedness and stability, and relations between computational efficiency and data structure and between constraint qualifications and error bounds and regularity. Problem types are finite dimensional and infinite dimensional, including optimal control, linear, nonlinear, and complementarity.

It is appropriate to mention that two other volumes based on the Symposium papers and bearing the same title were published by Marcel Dekker in this same series: Volume 73, 1982, and Volume 85, 1983.

Finally, I wish to thank the Operations Research Department, particularly for the typing assistance of Tessie Abacan, and the School of Engineering and Applied Science of George Washington University for supporting this work. I express my gratitude to Zuhair Nashed and Marcel Dekker, Inc., and especially to the authors for their valuable contributions. A special expression of gratitude is extended to the many highly qualified referees, whose reviews resulted in a significantly enhanced manuscript.

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