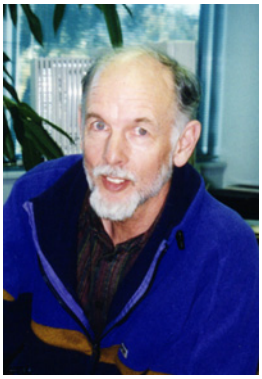
Preface



This special issue of CIS is dedicated to Professor John B. Moore, a leading scholar and a renowned researcher in control, optimization, and signal processing in telecommunications, on the occasion of his 60th birthday.

Born in China in 1941, Professor Moore obtained his Ph.D. degree from the University of Santa Clara in 1967. In the same year, he was appointed a Senior Lecturer in the Department of Electrical Engineering at the University of Newcastle, Australia. He was promoted to Full Professor in 1973, and served as the Department Head during 1975-1979. In 1982, he joined the Department of Systems Engineering, Research School of Physical Sciences, Australian National University as a Professorial Fellow. He was promoted to Professor in 1990. He has been Head of the Department since 1992. Professor Moore has held many prestigious visiting positions in the US, Asia, and Europe, including the Russell Springer Visiting Professorship at the University of California at Berkeley, and the Toshiba Chair of Intelligent Mechatronics at the University of Tokyo.

Professor Moore is a Fellow of the IEEE, a Fellow of the Australian Academy of Technological Sciences and Engineering, and a Fellow of the Australian Academy of Sciences. He has made many truly outstanding contributions in numerous research areas, especially in control, optimization, and signal processing in telecommunications. The significance of his outstanding research contributions is clearly reflected in his over 200 journal papers, 6 books, numerous conference papers, and commercialization projects. His books are well known to all who are working in the areas of control, optimization and signal processing. Web of Science Citations of his work since 1990 numbers in the thousands. High impact commercialization projects, which resulted from the research and development works of Professor Moore and his collaborators, include: the integrated circuit Mico-Logic 926, a polynomial solving routine used by IBM in their software packages distributed throughout the world from 1996 onwards, methodologies for the design of Boeing aircraft controllers, techniques in neuro-physiological studies of cell membrane to drugs in drug design experiments, online grasping algorithms of multi-fingered robots, and methodologies for optimizing the analysis in nuclear magnetic imaging.

The editors of this Special Issue have had the privilege of knowing John, both personally and professionally. In particular, the first editor has known him for over 25 years, first as a mentor and subsequently as a close colleague and friend. John's work has influenced the scientific activity of many researchers in the area of control, optimization, signal processing and their applications. More importantly, he has won the admiration and affection of those who know him. Professor Moore is an outstanding scholar, but more importantly, he is an excellent colleague and a very dear friend. His many research students and collaborators have always talked about the enjoyable, friendly, and inspiring occasions with John, both socially and professionally. In May 2001, John's students, colleagues, and friends took the opportunity of celebrating his 60th birthday to organize the International Workshop on Control, Optimization Signal Processing and Computer Communications at The Hong Kong

Polytechnic University in Hong Kong in recognition of his distinguished contributions in the areas of the Workshop. This international workshop brought together world-class researchers working in these areas to exchange ideas on the latest developments in the areas. Based on the presentations at the workshop, and integrating related contemporary contributions of the participants, papers were invited for this special issue of the international journal Communications in Information and Systems.

Conforming to the high standard expected for this journal, a stringent review process was adopted. Besides considering comments from independent reviewers for each paper, all papers recommended for acceptance were routed to the editorial board for final comments.

The Special Issue is divided into two parts: The first part contains papers mainly in the control area, while the second part contains papers in the areas of signal processing, parameter estimation, optimization, and nonlinear system theory.

The first part starts with three papers related to some recent theories for robust control, an area in which John Moore has made important contributions from as early as 1967. The first paper deals with a rather deep theoretical issue relating to quantification of concepts on robustness and modeling error. Necessary and sufficient conditions are established for ensuring the existence of a scalar homotopy in the Vinnicombe metric between two transfer functions. The second paper studies H-infinity control of a class of piecewise linear systems. A set of sufficient conditions is established for the solvability of the problem in terms of a set of Linear Matrix Inequalities. The third paper then addresses the robust H-infinity control problem for nonlinear systems with uncertainty. It is shown that the problem with uncertainty can be converted into a standard problem.

The next two papers cover extensions of two particular topics. One paper, which can be traced back to some collaborative work of John while he was in Hong Kong, looks at the case of indefinite stochastic LQ control where there are Markovian parameter jumps in the model. The results obtained include a new class of Riccati equations. The other paper arises from a problem in robotics which was tackled by John and his collaborators in Japan and in Germany. In this paper, a comprehensive treatment of engineering ideas in its natural mathematical setting of Jordan Algebra is presented.

The first part concludes with a paper on a particular nonlinear control system involving the motion control of a tensegrity platform. There is not much literature on this problem but there is a recent surge of interest because of its potential in space applications, etc.

The second part starts with three papers on estimation. The first paper presents a unified Bayesian approach to handle the out-of-sequence information problem. It investigates algorithms for both cluttered and non-cluttered scenarios involving single and multiple time-delayed measurements. Interestingly, the proposed algorithm makes use of a fixed-lag smoothing technique developed by John Moore decades ago. In the second paper, the maximum likelihood technique is used for the identification of parameters under the closed-loop operation. Expressions for the bias are derived, and the effects of the noise model are investigated. The third paper examines the limitation on the performance of estimation problems via the frequency-domain approach. The cases with white noise and Brownian motion are considered. The derived performance limitations are found to be related to some simple characteristics of the plant.

The next three papers are on optimization. The first paper considers the traffic

management of packet switching networks. It covers the development of simple and practically realizable adaptive rate allocation algorithms. The second optimization paper provides a unified and efficient approach to the optimum design of filters subject to time and/or frequency domain specifications. Under the specified constraints, the proposed algorithm is guaranteed to converge to the optimal solution if it exists. In the third paper, the Dutch auction system, with possible applications to serving mobile users via wireless communication, is considered. An optimal pricing decrement strategy is derived.

The second part of the Special Issue concludes with a paper on third order digital filters with two's complement arithmetic realized in parallel form. It is shown that under appropriate conditions, the system may exhibit chaotic behavior.

We would like to express our warmest thanks to the referees for their careful and critical evaluation of the manuscripts. We also wish to thank the Department of Applied Mathematics, Department of Electrical Engineering, Department of Electronic and Information Engineering, Department of Computing, and the Research Committee at The Hong Kong Polytechnic University, Department of Mathematics at the City University of Hong Kong, and the Department of Electrical and Electronic Engineering at the University of Melbourne, Australia for their financial support for the Workshop. Our sincere thanks also go to Ahmad Rad, Daniel Ho, and Vikram Krishnamurthy for their hard work in the organization of the Workshop.

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