

# A Distributed Parameter Approach to Design and Optimal Control of Dynamic Sensor Networks

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**ABSTRACT:** In this talk we discuss a class of sensor/actuator location problems for optimal zonal estimation and control of systems governed by partial differential equations (PDEs). We show that these problems are naturally formulated as infinite dimensional optimal control problems with operator Riccati equations as constraints and discuss theoretical and computational issues associated with these problems. We formulate the problems as hybrid systems on infinite dimensional spaces (coupled systems of partial, ordinary and delay differential equations) and use infinite dimensional theory to develop computational algorithms for the problems. We present numerical results to illustrate the ideas and suggest areas for future research.

**BIOGRAPHY:** John A. Burns is the Hatcher Professor of Mathematics at Virginia Tech and the Technical Director of the Interdisciplinary Center for Applied Mathematics. He has published over 150 research papers on computational methods for identification, optimization and control of systems governed by partial and functional differential equations. He has directed over twenty Ph.D. and ten MS students. He has served on more than 12 editorial boards and he was the founding Editor of the SIAM Book Series on Advances in Design and Control. He has served as Vice President of SIAM, is the past Chair of the SIAM Activity Group on Systems and Control and is a Fellow of the IEEE. Dr. Burns' primary interests concern the development of rigorous and practical computational algorithms for design and optimization of engineering and biological systems. He has applied his research to a wide variety of areas including fluid dynamics, smart materials, large space structures, nano-devices, aerodynamic design and energy management. Dr. Burns has been a consultant and advisor to Booz Allen & Hamilton, NASA Langley Research Center, The Air Force Research Labs, DARPA, The Babcock and Wilcox Company, Solers Inc., United Technologies and held several academic visiting positions in the USA and Europe.

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