

Preface

This Festschrift honors George Samuel Fishman, one of the founders of the field of computer simulation and a leader of the disciplines of operations research and the management sciences for the past five decades, on the occasion of his seventieth birthday. The papers in this volume span the theory, methodology, and application of computer simulation.

The lead article is appropriately titled “George Fishman’s Professional Career.” In this article we discuss George’s contributions to operations research and the management sciences, with special emphasis on his role in the advancement of the field of simulation since the 1960s. We also include a brief personal biography together with comments by several individuals about the extraordinary effect that George has had on all his students, colleagues, and friends.

The second article, titled “A Conversation with George Fishman,” is the transcript of an extended interview with George that we conducted in October 2007.

In the article titled “Computer Intensive Statistical Model Building,” Russell Cheng studies resampling methods for building parsimonious multiple linear regression models so as to represent accurately the behavior of the dependent variable in terms of the smallest possible subset of explanatory (independent) variables. The author shows how bootstrap resampling can be used not only for rapid identification of good models but also for efficient comparison of competing models.

The next article is titled “Patchwork Distributions.” In this article, Soumyadip Ghosh and Shane Henderson consider a class of multivariate probability distributions that can be used to model a finite-dimensional random vector when the user has specified all the marginal distributions of the random vector, the covariance matrix of the random vector, and the probabilities that the random vector lies in certain regions.

Peter Glynn and Eunji Lim examine the foundations of the batch-means method for steady-state simulation analysis in their article titled “Asymptotic Validity of Batch Means Steady-State Confidence Intervals.” Although the large-sample validity of many implementations of the batch-means method requires that the target output process must satisfy a functional central limit theorem, in this article the authors establish the validity of the batch-means method for Harris-recurrent Markov processes that satisfy a weaker (nonfunctional) central limit theorem.

In the article titled “Efficient Modeling of Delays in Discrete-Event Simulation,” Jim Henriksen considers the problem of efficiently implementing four types of delays that are commonly encountered in simulation modeling, with a detailed discussion of the solution approach provided by the delay-modeling algorithms that have been developed for the SLX simulation language.

In the article titled “Sampling from Linear Multivariate Densities,” Wolfgang Hörmann and Josef Leydold develop an efficient acceptance-rejection algorithm for generating a vector of dependent random variables whose joint density is linear with a domain that is bounded and symmetric about a point; and ultimately the authors extend their algorithm to generate random vectors from concave differentiable densities over point-symmetric domains.

Jack Kleijnen’s article, “Factor Screening in Simulation Experiments: Review of Sequential Bifurcation,” provides an overview of factor-screening methods for simulation experiments with special emphasis on sequential bifurcation, a method that is particularly effective in certain types of large-scale simulation studies.

“ \mathbb{F}_2 -Linear Random Number Generators,” by Pierre L’Ecuyer and François Panneton, is the ninth article in this volume. This article reviews various construction methods for random-number generators based on linear recurrence modulo 2, examines their theoretical properties, describes the relevant computational tools and algorithms, and ends with comparisons based on various qualitative criteria. The \mathbb{F}_2 -linear class contains many long-period random-number generators—including the Tausworthe, generalized feedback shift register (GSFR), twisted GSFR, Mersenne twister, WELL, and xorshift generators.

The tenth article is titled “Opportunities and Challenges in Health Care Simulation.” In this article Andrew F. Seila and Sally Brailsford review successful applications of simulation in health care, examine the suitability of simulation models and methods for the analysis of health-care systems, and explore the reasons for the lack of adoption of simulation as a “routine” tool for health-care systems analysis. The authors end with an insightful list of ideas aimed at promoting wider adoption of simulation in health care.

In the eleventh article, “Future Trends in Distributed Simulation and Distributed Virtual Environments,” Steffen Straßburger, Thomas Schulze, and Richard Fujimoto report the main results of a peer study of current trends in distributed simulation and distributed virtual environments. The survey assesses the current state of this methodology, its relevance to simulation practice, and the research challenges that must be addressed so as to facilitate the widespread use of this methodology in industry and government as well as in research organizations.

In “Combined Screening and Selection of the Best with Control Variates,” Shing Chih Tsai, Barry L. Nelson, and Jeremy Staum formulate ranking-and-selection procedures with screening that exploit point estimators based on the method of control variates to gain greater statistical efficiency. Compared with previous ranking-and-selection procedures that incorporate screening and selection of the best alternative, substantial improvements in performance are achieved by the new procedures.

In the final article, “Optimal Linear Combinations of Overlapping Variance Estimators for Steady-State Simulation,” Tüba Aktaran-Kalaycı, Christos Alexopoulos, David Goldsman, and James R. Wilson seek to estimate the variance parameter of a simulation output process using optimal linear combinations of variance estimators

based on the methods of overlapping batch means and standardized time series. From the latter estimators they derive asymptotically valid confidence intervals for both the mean and variance parameter of the target process.

We thank the authors who have contributed to this volume, especially for their forbearance throughout the lengthy process of completing this book. Special thanks go to Yvonne Smith (Georgia Tech), who produced the transcription of our interview with George, and to Carolyn Ford at Springer, who so ably supervised the production of this book. We are also indebted to Fred Hillier (Stanford University) and Gary Folven (Springer) for patiently guiding us through the entire process.

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Christos Alexopoulos
David Goldsman
James R. Wilson

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