Book Reviews

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BOOK REVIEWS

P. C. Consul, F. Famoye: LAGRANGIAN PROBABILITY DISTRIBUTIONS. Birkhäuser-Verlag, Boston, 2006. ISBN 0-8176-4365-6, 352 pages, hard cover, price USD 89.95.

The book acquaints researchers and graduate students with good mathematical, probabilistic and statistical knowledge, with the present-day stage of the theory of distributions derived from and/or closely connected with Lagrange expansions.

The book presents a comprehensive treatment of the almost infinite number of discrete Lagrangian probability distributions that can be divided into three subsets according to their probabilistic structure: (i) basic Lagrangian distributions, (ii) delta Lagrangian distributions, and (iii) general Lagrangian distributions. Chapter 1 covers mathematical, probabilistic, and statistical results needed in the sequel. The Lagrangian distributions, modified power series distributions (a special subclass of Lagrangian distributions) and also some of their basic characteristic properties are described in Chapters 2 and 3. The quasi-probability distributions (quasi-binomial distribution I and II, quasi-hypergeometric distribution I and II, quasi-Pólya distribution I and II, family of Gould series distributions, family of Abel series distributions) do not belong to the Lagrangian probability distributions, but are based upon some identities which are proved by the use of the Lagrange expansions, are included in Chapter 4. In Chapter 5 the authors consider a generalized stochastic urn model, the urn model with predetermined strategy for quasi-binomial distribution I and the urn model with predetermined strategy for quasi-Pólya distribution II with some selected samplings. They provide probability distributions that are either particular families of Lagrangian probability distributions or are associated with them. Branching process, queuing process (G/D/1 queue, M/G/1 queue), stochastic model of epidemic, enumeration of trees and cascade process are the topics of Chapter 6. These stochastic processes are related to the general Lagrangian probability distribution. Chapter 7 focuses on the class of modified power series distributions, their characteristics, properties, estimation. Chapters 8 through 12 are devoted to some basic Lagrangian distributions (Geeta distribution, Consul distribution, Borel distribution in Chapter 8) and some important generalized Lagrangian distributions (generalized Poisson distribution in Chapter 9, generalized negative binomial distribution in Chapter 10, generalized logarithmic series distribution in Chapter 11, and Lagrangian-Katz distribution in Chapter 12). Listed are the generating functions, moments, cumulants and recurrence relations, physical models leading to these distributions, estimation and testing procedures. Chapter 13 covers some random walks and jump models (all connected with Lagrangian distributions). The bivariate and multivariate extensions of univariate Lagrangian probability models are presented in Chapters 14 and 15, respectively. It is, according to the authors, a vast area of further research work on their properties and applications. Finally, Chapter 16 is devoted to various generating algorithms for selected Lagrangian probability models. The book concludes with a practically complete bibliography of the field.

The authors are leading persons in the field. They collected most of the results published in various journals during the last forty years and their work can be considered a textbook for advanced courses and seminars in theoretical and/or applied statistics. Lagrangian probability distributions can sufficiently define generating models for the process studied in different branches of science, applied science, technology, etc.

Gejza Wimmer

G. P. Galdi, R. Rannacher, A. M. Robertson, S. Turek: HEMODYNAMICAL FLOWS, MODELLING, ANALYSIS AND SIMULATION. Oberwolfach Seminars, Vol. 37. Birkhäuser-Verlag, Basel, 2008. ISBN 978-3-7643-7805-9, 501 pages, price EUR 49.95.

This volume consists of six contributions concerning mathematical tools and analysis for the blood flow in arteries and veins. Hence, the specific constitutive laws are applied to cover the characteristic properties of blood.

First, the review of the relevant continuum mechanics is given. This part includes the description of kinematics, governing equations, nonlinear viscous fluids, yield "stress" fluids, viscoelastic fluids, thixotropic fluids, rheometrical flows, rheometers, and nonlinear elastic solids.

Second, hemorheology is introduced. This part concerns blood components, relevant parameters for flow in the human cardiovascular system, multiphase behavior of blood in shear flows, platelet activation and blood coagulation, special considerations in rheometry of blood, viscosity of whole blood, yield stress behavior of blood, viscosity of blood, disease states and mechanical properties of blood, and the gender and mechanical properties of the blood.

Third part has the following subsections: problems in the pipe flow of a Navier-Stokes liquid, problems in non-Newtonian fluid mechanics, problems in liquid-particle interaction.

Chapter IV is entitled "'Methods for Numerical Flow Simulation". The subsections are the finite-element methods for simulation of viscous flow, the numerical simulation of pipe flow, and the mesh adaptation and model calibration.

In Chapter V, the following themes are tackled: fluid-'single rigid body' interaction, fluid 'many rigid bodies-wall' interaction, and fluid 'elastic structure' interaction.

Finally, Chapter VI, entitled "Numerical Techniques for Multiple Flow with Liquid-Solid Interaction" consists of the subsections numerical methods for incompressible flow, FSI for fluid-elastic solid configurations, and numerical techniques for fluid-rigid solid configurations.

Each chapter concludes with the corresponding bibliographical information. The book will be handy for those who are interested in the description of the flows of fluids with unusual properties, especially, of course, blood. It is suitable for physicists, mathematicians working in the analysis of fluid flows, students specializing in the mathematical modelling of fluids, and other related specialists. Libraries of technical and natural sciences universities are strongly recommended to provide this well written collection. The same recommendation concerns the research institutes of the relevant scope.

Ivan Straškraba