Population Balances Theory And Applications To Particulate Systems In Engineering

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PHILOSOPHY - Plato2+2=5 Critical Theory : This is What CRT Scholars Actually Believe Population Balances Theory And Applications
Chemical engineers have put population balances to most use, with applications in the areas of crystallization; gas-liquid, liquid-liquid, and solid-liquid dispersions; liquid membrane systems; fluidized bed reactors; aerosol reactors; and microbial cultures.

Population Balances: Theory and Applications to ...
Population Balances provides the only available treatment of the solution of inverse problems essential for identification of population balance models for breakage and aggregation processes, particle nucleation, growth processes, and more. This book is especially useful for process engineers interested in the simulation and control of particulate systems.

Population Balances: Theory and Applications to ...
Population Balances: Theory and Applications to Particulate Systems in Engineering eBook: Doraiswami Ramkrishna: Amazon.co.uk: Kindle Store

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Chemical engineers have put population balances to most use, with applications in the areas of crystallization; gas-liquid, liquid-liquid, and solid-liquid dispersions; liquid membrane systems; fluidized bed reactors; aerosol reactors; and microbial cultures.nRamkrishna provides a clear and general treatment of population balances with emphasis on their wide range of applicability.

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The evolution of the bubble size in a turbulent bubbly flow can be described by the population balance equation enhanced by kernels describing the breakup and coalescence of bubbles (Joshi, 2001),...

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Population Balances | ScienceDirect
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Population Balances - 1st Edition
Population Balances provides a clear and general treatment of population balance models of dispersed phase systems while encompassing their mathematical structure, derivation, formulation, solution, and identification, through inverse problems and stochastic formulations. A wide variety of applications is presented with a focus on both the unifying features of the underlying theory and their wide range of applicability.

Population Balances: Theory and Applications to ...
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Population Balances provides a clear and general treatment of population balance models of dispersed phase systems while encompassing their mathematical structure, derivation, formulation, solution, and identification, through inverse problems and stochastic formulations. A wide variety of applications is presented with a focus on both the unifying features of the underlying theory and their ...

Engineers encounter particles in a variety of systems. The particles are either naturally present or engineered into these systems. In either case these particles often significantly affect the behavior of such systems. This book provides a framework for analyzing these dispersed phase systems and describes how to synthesize the behavior of the population particles and their environment from the behavior of single particles in their local environments. Population balances are of key relevance to a very diverse group of scientists, including astrophysicists, high-energy physicists, geophysicists, colloid chemists, biophysicists, materials scientists, chemical engineers, and meteorologists. Chemical engineers have put population balances to most use, with applications in the areas of crystallization; gas-liquid, liquid-liquid, and solid-liquid dispersions; liquid membrane systems; fluidized bed reactors; aerosol reactors; and microbial cultures. Ramkrishna provides a clear and general treatment of population balances with emphasis on their wide range of applicability. New insight into population balance models incorporating random particle growth, dynamic morphological structure, and complex multivariate formulations with a clear exposition of their mathematical derivation is presented. Population Balances provides the only available treatment of the solution of inverse problems essential for identification of population balance models for breakage and aggregation processes, particle nucleation, growth processes, and more. This book is especially useful for process engineers interested in the simulation and control of particulate systems. Additionally, comprehensive treatment of the stochastic formulation of small systems provides for the modeling of stochastic systems with promising new areas of applications such as the design of sterilization systems and radiation treatment of cancerous tumors. A clear and general treatment of population balances with emphasis on their wide range of applicability. Thus all processes involving solid-fluid and liquid-liquid dispersions, biological populations, etc. are encompassed Provides new insight into population balance models incorporating random particle growth, dynamic morphological structure, and complex multivariate formulations with a clear exposition of their mathematical derivation Presents a wide range of solution techniques, Monte Carlo simulation methods with a lucid exposition of their origin and scope for enhancing computational efficiency An account of self-similar solutions of population balance equations and their significance to the treatment of data on particulate systems The only available treatment of the solution of inverse problems essential for identification of population balance models for breakage and aggregation processes, particle nucleation and growth processes and so on A comprehensive treatment of the stochastic formulation of small systems with several new applications

Written by leading multiphase flow and CFD experts, this book enables engineers and researchers to understand the use of PBM and CFD frameworks. Population balance approaches can now be used in conjunction with CFD, effectively driving more efficient and effective multiphase flow processes. Engineers familiar with standard CFD software, including ANSYS-CFX and ANSYS-Fluent, will be able to use the tools and approaches presented in this book in the effective research, modeling and control of multiphase flow problems. Builds a complete understanding of the theory behind the application of population balance models and an appreciation of the scale-up of computational fluid dynamics (CFD) and population balance modeling (PBM) to a variety of engineering and industry applications in chemical, pharmaceutical, energy and petrochemical sectors The tools in this book provide the opportunity to incorporate more accurate models in the design of chemical and particulate based multiphase processes Enables readers to translate theory to practical use with CFD software

A unique text providing comprehensive coverage of fundamental particle science, processing and technology. Including quantitative tools, real-world case studies and end-of-chapter problems, it is ideal for students in engineering and applied sciences, as well as for practitioners in a range of industries manufacturing particulate products.

Theory of Particulate Processes: Analysis and Techniques of Continuous Crystallization, Second Edition covers the numerous population balance-based particulate studies. This edition emerged from the notes for an industrial short course on crystallization. This book is divided into 10 chapters and begins with an outline of the methods for representation of particle distributions and a systematic approach to the predictive modeling of processes where there is a need to characterize distributions in time and space and by some identifying property. The succeeding chapters provide a specific and more elementary approach to modeling crystal size distributions, as well as the modeling the kinetics of crystal nucleation and growth rates. Other chapters discuss a wide range of system analysis and design considerations specific to crystallization for both the steady state and unsteady state. The final chapters illustrate the use of a population balance analysis to interpret data from both laboratory and process equipment. These chapters also explore a wide variety of particulate processes and systems for which the population balance analysis is useful. This book is of great value to graduate students with particulate systems course.

The book summarises the outcom of a priority research programme: 'Analysis, Modelling and Computation of Multiphase Flows'. The results of 24 individual research projects are presented. The main objective of the research programme was to provide a better understanding of the physical basis for multiphase gas-liquid flows as they are found in numerous chemical and biochemical reactors. The research comprises steady and unsteady multiphase flows in three frequently found reactor configurations, namely bubble columns without interiors, airlift loop reactors, and aerated stirred vessels. For this purpose new and improved measurement techniques were developed. From the resulting knowledge and data, new and refined models for describing the underlying physical processes were developed, which were used for the establishment and improvement of analytic as well as numerical methods for predicting multiphase reactors. Thereby, the development, lay-out and scale-up of such processes should be possible on a more reliable basis.

Bridging the gap between theory and practice, this text provides the reader with a comprehensive overview of industrial crystallization. Newcomers will learn all of the most important topics in industrial crystallization, from key concepts and basic theory to industrial practices. Topics covered include the characterization of a crystalline product and the basic process design for crystallization, as well as batch crystallization, measurement techniques, and details on precipitation, melt crystallization and polymorphism. Each chapter begins with an introduction explaining the importance of the topic, and is supported by homework problems and worked examples. Real world case studies are also provided, as well as new industry-relevant information, making this is an ideal resource for industry practitioners, students, and researchers in the fields of industrial crystallization, separation processes, particle synthesis, and particle technology.

The advances made possible by the development of molecular techniques have in recent years revolutionized quantitative genetics and its relevance for population genetics. Population Genetics and Microevolutionary Theory takes a modern approach to population genetics, incorporating modern molecular biology, species-level evolutionary biology, and a thorough acknowledgment of quantitative genetics as the theoretical basis for population genetics. Logically organized into three main sections on population structure and history, genotype-phenotype interactions, and selection/adaptation Extensive use of real examples to illustrate concepts Written in a clear and accessible manner and devoid of complex mathematical equations Includes the author's introduction to background material as well as a conclusion for a handy overview of the field and its modern applications Each chapter ends with a set of review questions and answers Offers helpful general references and Internet links

Integrated Population Models: Theory and Ecological Applications with R and JAGS is the first book on integrated population models, which constitute a powerful framework for combining multiple data sets from the population and the individual levels to estimate demographic parameters, and population size and trends. These models identify drivers of population dynamics and forecast the composition and trajectory of a population. Written by two population ecologists with expertise on integrated population modeling, this book provides a comprehensive synthesis of the relevant theory of integrated population models with an extensive overview of practical applications, using Bayesian methods by means of case studies. The book contains fully-documented, complete code for fitting all models in the free software, R and JAGS. It also includes all required code for pre- and post-model-fitting analysis. Integrated Population Models is an invaluable reference for researchers and practitioners involved in population analysis, and for graduate-level students in ecology, conservation biology, wildlife management, and related fields. The text is ideal for self-study and advanced graduate-level courses. Offers practical and accessible ecological applications of IPMs (integrated population models) Provides full documentation of analyzed code in the Bayesian framework Written and structured for an easy approach to the subject, especially for non-statisticians

Chemical Reactor Modeling closes the gap between Chemical Reaction Engineering and Fluid Mechanics. The second edition consists of two volumes: Volume 1: Fundamentals. Volume 2: Chemical Engineering Applications In volume 1 most of the fundamental theory is presented. A few numerical model simulation application examples are given to elucidate the link between theory and applications. In volume 2 the chemical reactor equipment to be modeled are described. Several engineering models are introduced and discussed. A survey of the frequently used numerical methods, algorithms and schemes is provided. A few practical engineering applications of the modeling tools are presented and discussed. The working principles of several experimental techniques employed in order to get data for model validation are outlined. The monograph is based on lectures regularly taught in the fourth and fifth years graduate courses in transport phenomena and chemical reactor modeling and in a post graduate course in modern reactor modeling at the Norwegian University of Science and Technology, Department of Chemical Engineering, Trondheim, Norway. The objective of the book is to present the fundamentals of the single-fluid and multi-fluid models for the analysis of single and multiphase reactive flows in chemical reactors with a chemical reactor engineering rather than mathematical bias. Organized into 13 chapters, it combines theoretical aspects and practical applications and covers some of the recent research in several areas of chemical reactor engineering. This book contains a survey of the modern literature in the field of chemical reactor modeling.

This book presents models written as partial differential equations and originating from various questions in population biology, such as physiologically structured equations, adaptive dynamics, and bacterial movement. Its purpose is to derive appropriate mathematical tools and qualitative properties of the solutions. The book further contains many original PDE problems originating in biosciences.

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