



Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering

Ashok Kumar Verma

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The use of simulation plays a vital part in developing an integrated approach to process design. By helping save time and money before the actual trial of a concept, this practice can assist with troubleshooting, design, control, revamping, and more. **Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering** explores effective modeling and simulation approaches for solving equations. Using a systematic treatment of model development and simulation studies for chemical, biochemical, and environmental processes, this book explains the simplification of a complicated process at various levels with the help of a "model sketch."

It introduces several types of models, examines how they are developed, and provides examples from a wide range of applications. This includes the simple models based on simple laws such as Fick's law, models that consist of generalized equations such as equations of motion, discrete-event models and stochastic models (which consider at least one variable as a discrete variable), and models based on population balance.

Divided into 11 chapters, this book:

- Presents a systematic approach of model development in view of the simulation need
- Includes modeling techniques to model hydrodynamics, mass and heat transfer, and reactors for single as well as multi-phase systems
- Provides stochastic and population balance models
- Covers the application and development of artificial neural network models and hybrid ANN models
- Highlights gradients based techniques as well as statistical techniques for model validation and sensitivity analysis
- Contains examples on development of analytical, stochastic, numerical, and ANN-based models and simulation studies using them
- Illustrates modeling concepts with a wide spectrum of classical as well as recent research papers

Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering includes recent trends in modeling and simulation, e.g. artificial neural network (ANN)-based models, and hybrid models. It contains a chapter on flowsheeting and batch processes using commercial/open source software for simulation.

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