Closed-form Solutions for Drug Transport through Controlled-Release Devices in Two and Three Dimensions

Description: Provides solutions for two- and three-dimensional linear models of controlled-release systems

Designed to administer an exact dosage of an API to a target site during a treatment period, controlled-release drug-delivery systems regulate the therapeutic agent release rate while it is being delivered to a particular location.

Closed-form Solutions for Drug Transport through Controlled-Release Devices in Two and Three Dimensions covers various classical and analytical techniques to solve boundary-value problems involving two- and three-dimensional partial differential equations (PDEs.) These methods are applied to study drug-transport mechanisms in 2-D and 3-D coordinate systems and result in a detailed picture of the evolution of active pharmaceutical ingredients (APIs) through a controlled-released (CR) device or a membrane.

Mathematical modeling platforms, that can represent the transport mechanisms adequately, are important assets in the fabrication of these products, as well. This book shows how analytical tools, routinely used by physicists, mathematicians and engineers, can be implemented to guide the design of CR devices. A host of diverse real-world applications are taken from the literature to help illustrate the methods in Cartesian, cylindrical and spherical coordinate systems.

Closed-form Solutions for Drug Transport through Controlled-Release Devices in Two and Three Dimensions features:

- Real-world applications are taken from used to help illustrate the methods in Cartesian, cylindrical and spherical coordinate systems
- Modeling of drug-delivery systems and provide mathematical tools to evaluate and build controlled-release devices
- Classical and analytical techniques to solve boundary-value problems involving two- and three-dimensional partial differential equations
- Detailed examples, case studies and step-by-step analytical solutions to relevant problems using popular computational software

The textbook is presented in a manner to help the reader apply the theory to their problems. For researchers in the field, the integration of modeling and simulations at an early design stage is crucial in the development of new technologies. The materials covered in the book will help provide a good foundation for anyone who wishes to be involved in cutting-edge drug-delivery research.

Laurent Simon, PhD, is Associate Professor of Chemical Engineering and served as the Associate Director of the Pharmaceutical Engineering Program at New Jersey Institute of Technology. Dr. Simon is the author of Laboratory Online, a series of educational and interactive modules that help engineers build a strong understanding of drug delivery technologies and their underlying engineering principles. During his time at NJIT, Dr. Simon has received the Excellence in Teaching Award, Master Teacher Designation, Newark College of Engineering Saul K. Fenster Innovation in Engineering Education Award and a Distinguished Teaching Award from the American Society of Engineering Education (ASEE).

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