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Conclusions; Acknowledgments; Notation; Chapter 3 Neural Networks: Their Role in High-Pressure Processing; 4.1. Introduction; 4.2. Thermofluiddynamic Phenomena under High-Pressure Conditions 4.3. Mathematical Modeling and Numerical Simulation of High-Pressure Processes 4.4. Prediction of Process Impact and Control of High-Pressure Treatment; 4.5. Conclusions and Outlook; Acknowledgment; Notation; Chapter 4 Computational Fluid Dynamics Applied in High-Pressure Processing Scale-Up; 5.1. Introduction; 5.2. Description of an HPHT Processing System; 5.3. Developing a CFD Model for an HPHT System; 5.4. Prediction of Temperature Uniformity and Flow by Means of CFD Modeling; 5.5. Distribution of Process Sterility by Coupling with Kinetic *C. botulinum* Inactivation Models 5.6. Dimensionless Parameters to Express the Process Performance 5.7. Overview and Future Challenges; Notation; Chapter 5 Computational Fluid Dynamics Applied in High-Pressure High-Temperature Processes: Spore Inactivation Distribution and Process Optimization; 6.1. Introduction; 6.2. EM Wave Equations; 6.3. Solutions to Maxwell's Equations; 6.4. MW Heating Equations; 6.5. Computer Simulation of MW Heating; 6.6. Simulation Model for MW Sterilization; 6.7. Conclusion; Notation; Chapter 6 Computer Simulation for Microwave Heating; 7.1. Introduction; 7.2. Microwave Thermal Modeling 7.3. Temperature Measurement (Mapping) Methods in Microwave Fields 7.4. Examples of Validated Microwave Heating Models; 7.5. Summary, Conclusions, and Outlook; Notation; Chapter 7 Simulating and Measuring Transient Three-Dimensional Temperature Distributions in Microwave Processing; 8.1. Introduction; 8.2. Electrical Heating of Foods: Governing Processes; 8.3. Modeling and Validation; 8.4. Further Development of Ohmic Heating and Appropriate Modeling; 8.5. Conclusions; Notation; Chapter 8 Multiphysics Modeling of Ohmic Heating; 9.1. Introduction 9.2. Governing Equations for Multiphysics Simulation of PEF Processing

Sommario/riassunto

Part of the IFT (Institute of Food Technologists) series, this book discusses multiphysics modeling and its application in the development, optimization, and scale-up of emerging food processing technologies. The book covers recent research outcomes to demonstrate process efficiency and the impact on scalability, safety, and quality, and technologies including High Pressure Processing, High Pressure Thermal Sterilization, Radiofrequency, Ultrasound, Ultraviolet, and Pulsed Electric Fields Processing. Ideal for food and process engineers, food technologists, equipment designers, microbiologists
