



# Computational Fluid Dynamics in Food Processing (Contemporary Food Engineering)

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The implementation of early-stage simulation tools, specifically computational fluid dynamics (CFD), is an international and interdisciplinary trend that allows engineers to computer-test concepts all the way through the development of a process or system. With the enhancement of computing power and efficiency, and the availability of affordable CFD packages, the applications of CFD have extended into the food industry for modeling industrial processes, performing comprehensive analyses, and optimizing the efficiency and cost effectiveness of the new processes and systems.

Beginning a new series dedicated to contemporary, up-to-date food engineering practices, **Computational Fluid Dynamics in Food Processing** is the first book of its kind to illustrate the use of CFD for solving heat and mass transfer problems in the food industry. Using a computational grid, CFD solves governing equations that describe fluid flow across each grid cell by means of an iterative procedure in order to predict and visualize the profiles of velocity, temperature, pressure, and other parameters. Starting with an overview of CFD technology and applications, the book illustrates the use of CFD for gaining a qualitative and quantitative assessment of the performance of processes involving heat and mass transfer. Specific chapters cover airflow in refrigerated trucks, retail display cabinets, microwaves, and doorways; velocity in meat dryers and spray drying; thermal sterilization; plate heat exchangers; membrane separation systems; jet impingement ovens; food extrusion and high-pressure processing; prediction of hygiene; design of biosensors; and the fermentation of tea and ripening of cheese.

Drawing from an esteemed panel of international professionals and academics, this groundbreaking book provides engineers and technologists in research, development, and operations with critical, comprehensive, and readily accessible information on the art and science of CFD technology.

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### **Editorial Review**

#### **Review**

The outstanding features of this book are the comprehensive and detailed treatment of the subject matter as well as the excellent layout and high standard of editing and production. It is well illustrated to the extent that many of the model predictions are reproduced in colour which helps in the interpretation of the velocity and temperature profiles. Those who engage with this book will find a wealth of useful information, not only in the technology of various processes but in the detail of the mathematical treatments.

...This book is highly recommended to research workers, lecturers and technologists involved in food process operations, particularly product safety and shelf-life integrity.

*Donald Holdsworth, Food & Drink Subject Group Newsletter, May 2010.*

#### **About the Author**

University College Dublin, Ireland

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