

FLUID MECHANICS FOR CHEMICAL ENGINEERS

WITH MICROFLUIDICS, CFD,
AND COMSOL MULTIPHYSICS 5

THIRD EDITION

JAMES O. WILKES

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INTERNATIONAL SERIES IN THE
PHYSICAL AND CHEMICAL ENGINEERING SCIENCES



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Solutions Manual for Fluid Mechanics for Chemical Engineers James O. Wilkes, 2005 **Analysis, Synthesis and Design of Chemical Processes** Richard Turton, Richard C. Bailie, Wallace B. Whiting, Joseph A. Shaeiwitz, 2008-12-24 The Leading Integrated Chemical Process Design Guide Now with New Problems New Projects and More More than ever effective design is the focal point of sound chemical engineering Analysis Synthesis and Design of Chemical Processes Third Edition presents design as a creative process that integrates both the big picture and the small details and knows which to stress when and why Realistic from start to finish this book moves readers beyond classroom exercises into open ended real world process problem solving The authors introduce integrated techniques for every facet of the discipline from finance to operations new plant design to existing process optimization This fully updated Third Edition presents entirely new problems at the end of every chapter It also adds extensive coverage of batch process design including realistic examples of equipment sizing for batch sequencing batch scheduling for multi product plants improving production via intermediate storage and parallel equipment and new optimization techniques specifically for batch processes Coverage includes Conceptualizing and analyzing chemical processes flow diagrams tracing process conditions and more Chemical process economics analyzing capital and manufacturing costs and predicting or assessing profitability Synthesizing and optimizing chemical processing experience based principles BFD PFD simulations and more Analyzing process performance via I O models performance curves and other tools Process troubleshooting and debottlenecking Chemical engineering design and society ethics professionalism health safety and new green engineering techniques Participating successfully in chemical engineering design teams Analysis Synthesis and Design of Chemical Processes Third Edition draws on nearly 35 years of innovative chemical engineering instruction at West Virginia University It includes suggested curricula for both single semester and year long design courses case studies and design projects with practical applications and appendixes with current equipment cost data and preliminary design information for eleven chemical processes including seven brand new to this edition

Fluid Mechanics for Chemical Engineers with Microfluidics and CFD. James O. Wilkes, 2006 This second edition contains extensive new coverage of both microfluidics and computational fluid dynamics systematically demonstrating CFD through detailed examples using FlowLab and COMSOL Multiphysics The chapter on turbulence has been extensively revised to address more complex and realistic challenges including turbulent mixing and recirculating flows Jacket **Problem Solving in Chemical and Biochemical Engineering with POLYMATH, Excel, and MATLAB** Michael B. Cutlip, Mordechai Shacham, 2008 Problem Solving in Chemical and Biochemical Engineering with POLYMATH Excel and MATLAB Second Edition is a valuable resource and companion that integrates the use of numerical problem solving in the three most widely used software packages POLYMATH Microsoft Excel and MATLAB Recently developed POLYMATH capabilities allow the automatic creation of Excel spreadsheets and the generation of MATLAB code for problem solutions

Students and professional engineers will appreciate the ease with which problems can be entered into POLYMATH and then solved independently in all three software packages while taking full advantage of the unique capabilities within each package. The book includes more than 170 problems requiring numerical solutions. This greatly expanded and revised second edition includes new chapters on getting started with and using Excel and MATLAB. It also places special emphasis on biochemical engineering with a major chapter on the subject and with the integration of biochemical problems throughout the book.

General Topics and Subject Areas Organized by Chapter:

- Introduction to Problem Solving with Mathematical Software Packages
- Basic Principles and Calculations
- Regression and Correlation of Data
- Introduction to Problem Solving with Excel
- Introduction to Problem Solving with MATLAB
- Advanced Problem Solving Techniques
- Thermodynamics
- Fluid Mechanics
- Heat Transfer
- Mass Transfer
- Chemical Reaction Engineering
- Phase Equilibrium and Distillation Process
- Dynamics and Control
- Biochemical Engineering
- Practical Aspects of Problem Solving
- Capabilities
- Simultaneous Linear Equations
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- Linear Multiple Linear and Nonlinear Regressions with Statistical Analyses
- Partial Differential Equations
- Using the Numerical Method of Lines
- Curve Fitting by Polynomials with Statistical Analysis
- Simultaneous Ordinary Differential Equations
- Including Problems Involving Stiff Systems
- Differential Algebraic Equations
- and Parameter Estimation in Systems of Ordinary Differential Equations

The Book's Web Site: <http://www.problemsolvingbook.com> Provides solved and partially solved problem files for all three software packages plus additional materials. Describes discounted purchase options for educational version of POLYMATH available to book purchasers. Includes detailed selected problem solutions in Maple, Mathcad, and Mathematica.

Perry's Chemical Engineers' Handbook Robert H. Perry, Don W. Green, James O. Maloney, 1997 Reference work for chemical and process engineers. Newest developments, advances, achievements, and methods in various fields.

Fluid Mechanics for Chemical Engineers Noel De Nevers, 1991 This is intended as an introduction to fluid mechanics for third-year Chemical Engineering students. The presentation of fluid mechanics is clear and simple with numerous detailed examples.

Fluid Mechanics for Chemical Engineers James O. Wilkes, 2017-07-20 The Chemical Engineer's Practical Guide to Fluid Mechanics Now Includes COMSOL Multiphysics 5. Since most chemical processing applications are conducted either partially or totally in the fluid phase, chemical engineers need mastery of fluid mechanics. Such knowledge is especially valuable in the biochemical, chemical, energy, fermentation, materials, mining, petroleum, pharmaceuticals, polymer, and waste processing industries.

Fluid Mechanics for Chemical Engineers with Microfluidics, CFD, and COMSOL Multiphysics 5 Third Edition systematically introduces fluid mechanics from the perspective of the chemical engineer who must understand actual physical behavior and solve real-world problems. Building on the book that earned Choice Magazine's Outstanding Academic Title award, this edition also gives a comprehensive introduction to the popular COMSOL Multiphysics 5 software. This third edition contains extensive coverage of both microfluidics and computational fluid dynamics, systematically demonstrating CFD through detailed examples using COMSOL Multiphysics 5.

and ANSYS Fluent The chapter on turbulence now presents valuable CFD techniques to investigate practical situations such as turbulent mixing and recirculating flows Part I offers a clear succinct easy to follow introduction to macroscopic fluid mechanics including physical properties hydrostatics basic rate laws and fundamental principles of flow through equipment Part II turns to microscopic fluid mechanics Differential equations of fluid mechanics Viscous flow problems some including polymer processing Laplace s equation irrotational and porous media flows Nearly unidirectional flows from boundary layers to lubrication calendaring and thin film applications Turbulent flows showing how the k method extends conventional mixing length theory Bubble motion two phase flow and fluidization Non Newtonian fluids including inelastic and viscoelastic fluids Microfluidics and electrokinetic flow effects including electroosmosis electrophoresis streaming potentials and electroosmotic switching Computational fluid mechanics with ANSYS Fluent and COMSOL Multiphysics Nearly 100 completely worked practical examples include 12 new COMSOL 5 examples boundary layer flow non Newtonian flow jet flow die flow lubrication momentum diffusion turbulent flow and others More than 300 end of chapter problems of varying complexity are presented including several from University of Cambridge exams The author covers all material needed for the fluid mechanics portion of the professional engineer s exam The author s website fmche.engin.umich.edu provides additional notes problem solving tips and errata Register your book for convenient access to downloads updates and or corrections as they become available See inside book for details

Introduction to Chemical Engineering Fluid Mechanics
William M. Deen, 2016 **Fluid Mechanics for Chemical Engineers with Engineering Subscription Card** Noel De Nevers, 2004-02 Fluid Mechanics for Chemical Engineers third edition retains the characteristics that made this introductory text a success in prior editions It is still a book that emphasizes material and energy balances and maintains a practical orientation throughout No more math is included than is required to understand the concepts presented To meet the demands of today s market the author has included many problems suitable for solution by computer Three brand new chapters are included Chapter 15 on Two and Three Dimensional Fluid Mechanics Chapter 19 on Mixing and Chapter 20 on Computational Fluid Dynamics CFD [Fluid Mechanics for Chemical Engineers](#) Noel De Nevers, 2020-03-17

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