

CONTENTS

CONTRIBUTORS TO THIS VOLUME	ix
PREFACE	xiii

SECTION I: PROPERTIES OF DISPERSED AND ATOMIZED FLOWS

1. Measurement and Physical Properties of Foam	3
<i>H. C. Cheng and T. E. Natan, Jr.</i>	
2. Hydrodynamics of Foam Flow in Pipes, Capillary Tubes, and Porous Media	26
<i>G. R. Assar and R. W. Burley</i>	
3. Properties and Characteristics of Drops and Bubbles	43
<i>J. R. Grace and T. Wairegi</i>	
4. Bubble Formation and Its Movement in Newtonian and Non-Newtonian Liquids	58
<i>N. Rabiger and A. Vogelpohl</i>	
5. Creeping Flow Around Bubbles	89
<i>A. S. Sangani</i>	
6. Correlations for Bubble Rise in Gas-Liquid Systems	110
<i>M. E. Abou-El-Hassan</i>	
7. Bubble Nucleation	121
<i>R. Mesler</i>	
8. Bubble Growth in Superheated Liquid Droplets	130
<i>C. T. Avedisian</i>	
9. Hydrodynamics of Bubble Formation from Submerged Orifices	191
<i>H. Tsuge</i>	
10. Mechanisms of Breakup of Round Liquid Jets	233
<i>R. D. Reitz and F. V. Bracco</i>	

11. Hydrodynamics of Liquid Drops in Air	250
<i>G. S. R. Narasimhamurty, A. Purushothaman, and K. Sivaji</i>	
12. Dynamics of Gas-Liquid Spray Systems	280
<i>W. S. Yeung</i>	
13. Hydrodynamic Mixing of Dispersed and Atomized Flows	301
<i>N. P. Cheremisinoff</i>	
14. Mechanics and Design of Centrifugal Swirl Nozzles	365
<i>D. E. Dietrich</i>	
15. Momentum Equations in Dispersed Two-Phase Flows	371
<i>H. E. A. van den Akker</i>	

SECTION II: FLOW REGIMES, HOLD-UP, AND PRESSURE DROP

16. Flow Pattern Transition in Two-Phase Gas-Liquid Flows	403
<i>D. Barnea and Y. Taitel.</i>	
17. Interfacial Phenomena of Fully-Developed, Stratified, Two-Phase Flows	475
<i>Y. L. Sinai</i>	
18. Hold-Up in Multiphase Flow	492
<i>P. L. Spedding, and J. J. J. Chen</i>	
19. Predicting Two-Phase Flow Pressure Drop	532
<i>D. Chisholm</i>	
20. Co-Current Horizontal and Vertical Upwards Flow of Gas and Non-Newtonian Liquid	563
<i>R. P. Chhabra and J. F. Richardson</i>	
21. Stability of Annular Flow in Horizontal Tubes	610
<i>V. Kadambi</i>	
22. Flow Pattern Transitions During Horizontal In-Tube Condensation	629
<i>H. M. Soliman</i>	
23. Two-Phase Flow in Vertical Noncircular Channels	651
<i>Y. Sato and M. Sadatomi</i>	

24. Sonic Velocity in Two-Phase, Separated Flow	665
<i>R. V. Smith and F. Rehman</i>	
25. Two-Phase Flows in Junctions	677
<i>B. J. Azzopardi</i>	
26. Effect of Flow Obstructions on Flow Transitions and Pressure Drop in Two-Phase Flows	714
<i>M. E. Salcudean</i>	
27. Vortex Emission Behind Obstacles in Two-Phase Flows	771
<i>J. P. Hulin, A. J. M. Foussat, G. S. Strumolo, and D. Gaudin</i>	
28. Techniques for Flow Pattern Studies	811
<i>M. S. Quraishi and T. Z. Fahidy</i>	
29. Two-Phase Flow Measurements with Orifices	841
<i>Z. H. Lin</i>	
30. Turbulence Models for Two-Phase Flows	863
<i>T. W. Abou-Arab</i>	
31. Modeling Techniques for Dispersed Multiphase Flows	908
<i>S. W. Webb and D. S. Rowe</i>	

SECTION III: REACTORS AND INDUSTRIAL APPLICATIONS

32. Contacting and Hydrodynamics in Trickle-Bed Reactors	969
<i>M. P. Dudukovic and P. L. Mills</i>	
33. Residence-Time Modeling of Trickle-Flow Reactors	1018
<i>P. F. Greenfield and D. Sudarmana</i>	
34. Analysis of Gas Discharge from Packed Beds	1068
<i>J. Drahos and J. Cermak</i>	
35. Determining Liquid-Side Mass-Transfer Coefficients and Effective Interfacial Area in Gas-Liquid Contactors	1101
<i>J. K. Gehlawat</i>	
36. Radial Liquid Mixing in Co-Current Gas-Liquid Upflow Packed Beds	1121
<i>M. Nakamura</i>	

37. Axial Mixing in Multiphase Sparged Contactors	1136
<i>J. B. Joshi, A. B. Pandit, and K. S. M. S. Raghav Rao</i>	
38. Flow Patterns in Bubble Columns	1180
<i>K. Viswanathan</i>	
39. Design and Operation of Bubble Column Reactors	1216
<i>S. P. Godbole and Y. T. Shah</i>	
40. Modeling Bubble Column Reactors	1240
<i>W. Krug and K. Hertwig</i>	
41. Hold-Up and Interfacial Areas in Pulsed Liquid-Liquid Sieve Plate Columns	1275
<i>J. A. Golding</i>	
42. Hydrodynamics of Pulsed Sieve Plate Extraction Columns ...	1286
<i>D. Neibuhr</i>	
43. Predicting Transient Subcooled Two-Phase Flows	1319
<i>H. A. Khater</i>	
44. Predicting Quench Front Velocity in the Rewetting of Hot Surfaces	1339
<i>E. Oliveri, F. Castiglia, S. Taibi, and G. Vella</i>	
45. Heat Transfer and Hydrodynamics of Two-Phase Annular Flow	1356
<i>K. Suzuki</i>	
46. Heat Transport in Nuclear Reactor Channels	1392
<i>J. Lach, M. Kielkiewicz, and M. Kosinski</i>	
47. Flow in Thin-Film Evaporators	1449
<i>K. Nakamura and T. Watanabe</i>	
48. Hydraulics of Distillation Column Piping	1472
<i>R. Kern</i>	
49. Hydrodynamics and Hold-Up in Air-Lift Reactors	1485
<i>J. C. Merchuk</i>	
INDEX	1513