Fluidization and Fluid-Particle Systems Vol. I

- 1. Fluid-Particle Operations in the Process Industries
 - a. Process Development
 - b. Fluid-Bed Processing, Dilute-Phase and Transport Processing, and Moving Bed Processing
- 2. Observations on the Rheology of Powders
 - a. The Angle of Internal Friction α
 - b. The Angle of Repose β
 - c. The Angle of Rupture $\boldsymbol{\delta}$
 - d. The Angle of Slide ω
- 3. Particle and Powder Physical Characteristics
 - a. Mean Particle Diameter
 - b. Size-Frequency Relationships
 - c. Shape Factors and Equivalent Diameters
 - d. Packing Characteristics
 - e. The Concept of Powder Viscosity
 - f. Methods of Particle-Size Measurement
- 4. The Gravity Flow of Bulk Solids
 - a. Specific Correlations
 - b. The Generalized Correlation
 - c. Wall Effects
 - d. Hopper Cone-Angle Effects
 - e. Additional Data and Related Studies
 - f. Cyclone Dipleg Capacity
 - g. Moving-Bed Process Applications
 - h. Mixing and Distribution of Solids Flow
 - i. Flow Characteristics of Fine Powders
 - j. Standpipe Flow and Solids Friction
 - k. Countercurrent Fluid-Solids Flow Through Restrictions
- 5. Flow Through Fixed Beds
 - a. Blake's Correlation
 - b. Work of Carman and Kozeny
 - c. Chilton and Colburn's Correlation
 - d. Bakhmetef and Feodoroff
 - e. Blake's Experiments at High Reynolds Numbers
 - f. Oman and Watson
 - g. Composite Correlation
 - h. Bureau of Mines Correlation
 - i. Estimation of Shape Factors
 - j. Happel's Correlation Ergun's Correlation
 - k. The Correlation of Rose and Rizk
 - 1. Pressure Head and Seepage Rate
 - m. Trickle Flow
 - n. Upflowing Fixed Beds
- 6. The Motion of Single Particles in Fluids
 - a. Drag Forces
 - b. Stokes' Law and Free Fall
 - c. The Cunningham Correction
 - d. Brownian Motion and Particle Displacement
 - e. Boundary Effects
 - f. Effect of Shape on Drag Coefficient
 - g. Particle Trajectories
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- i. Effect of Turbulence on Drag
- j. Wake and Vortex Effects
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- 7. Flow Through Fluidized Beds
 - a. Particle Fluidization
 - b. Aggregative Fluidization
 - c. Criteria for Particulate Versus Aggregative Fluidization
 - d. Tapered Beds
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 - f. Particle Attrition
 - g. Channeling
- 8. The Bubble Phenomenon in Fluidized Beds
 - a. Mechanism of Gas Flow in Fluidized Beds and of Bubble Formation
 - b. Dispersion of Gas Bubbles and of Particulate Solids
 - c. Effectiveness of Gas Catalyst Contact
 - d. Bubble Size and Velocity
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- 9. Fluid and Solids Circulation in Fluidized Beds
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 - c. Gas Mixing and Liquid Mixing
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 - a. Flow Characteristics in Horizontal and Vertical Conveying
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 - d. Mixed-Size Particles
 - e. Relation of Choking and Saltation Phenomena to Dilute-Phase Fluidization
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- 12. Particle Carry-Over From Fluidized Beds
 - a. The Mechanisms of Particle Carry-Over
 - b. A Theoretical Approach to Entrainment Through Forces Acting on the Particles
 - c. An Empirical Approach to Entrainment Through Saturation Disperse-Phase Particle Transport Correlations
 - d. The Typical Entrainment Curve
 - e. Velocity Dissipation and Entrainment Below TDH
 - f. Effect of Pressure on Entrainment
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- k. Separators: Entrainment, Gravity, Impingement, Filtration, Cyclone, Electrostatic, and Sonic
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 - b. Mass Transfer in Fluidized Beds and Fixed Beds
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