

Particle Characterization (PG) - Video course

COURSE OUTLINE

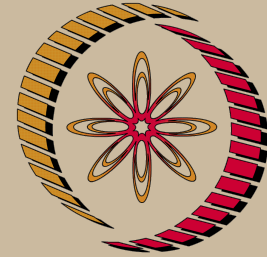
This advanced course in "Particle Characterization" deals with methods and techniques for quantitatively and qualitatively evaluating properties of single particles and particulate assemblies. Emphasis is on the fine-particle size range, from micrometers to nanometers. Particle characteristics are linked to relevant applications in industry. Transport properties, adhesion/ cohesion phenomena and surface-particle removal mechanisms are dealt with in detail.

Contents:

- 1. Introduction:** Need for studying particle characteristics; Typical industrial applications; emerging nano-particle technologies; microelectronics applications.
- 2. Single Particle:** Concept & Definition; Particle Surface; Surface-Fluid Interactions; Sub-Surface Region; Internal Grain Boundaries; Interior of Particle; Size; Shape.
- 3. Particulate Assemblies:** Description & Properties; Statistical Concepts; Mean Diameters & Shape Factors; Distribution Functions & Models; Surface Area & Specific Surface Calculations.
- 4. Fine Particle Characterization:** Size Analysis & Sampling; Shape Determination Methods; Pattern Recognition & Feature Extraction; Particle Signature & Meloy Equations; Property Representation.
- 5. Physico-Chemical Properties:** Visual Appearance; Absorption; Electrical Properties; Transport Properties; Adhesion & Deposition; Removal from Surfaces; Magnetism; Thermal Conductivity; Aggregation, Coagulation & Restructuring; Chemical Properties.
- 6. Applications:** Dust Explosions; Dust Flame Propagation; Health Hazards; Deserts & Sand Movement; Hazard Potential of Heat-Transfer Fluids; Atmospheric Aerosols; Nano-technology.

COURSE DETAIL

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Aerospace Engineering

Pre-requisites:

UG courses in

- Mechanical Operations
- Fluid Mechanics
- Heat Transfer
- Mass Transfer

Additional Reading:

1. "Particle Characterization: Light Scattering Methods", **Renliang Xu**, Kluwer Academic Publishers (The Netherlands), 2001.
2. "Introduction to Particle Technology", Edited by **Martin Rhodes**, 2nd Edition, Wiley, 2008.

Coordinators:

Dr. R. Nagarajan

Sl. No.	Topic	No. of Hours
1	Introduction: Need for studying particle characteristics; Typical industrial applications; emerging nano-particle technologies; microelectronics applications.	2
2	Single Particle: Concept & Definition; Particle Surface; Surface-Fluid Interactions; Sub-Surface Region; Internal Grain Boundaries; Interior of Particle; Size; Shape.	6
3	Particulate Assemblies: Description & Properties; Statistical Concepts; Mean Diameters & Shape Factors; Distribution Functions & Models; Surface Area & Specific Surface Calculations.	6
4	Fine Particle Characterization: Size Analysis & Sampling; Shape Determination Methods; Pattern Recognition & Feature Extraction; Particle Signature & Meloy Equations; Property Representation.	8
5	Physico-Chemical Properties: Visual Appearance; Absorption; Electrical Properties; Transport Properties; Adhesion & Deposition; Removal from Surfaces; Magnetism; Thermal Conductivity; Aggregation, Coagulation & Restructuring; Chemical Properties.	10
6	Applications: Dust Explosions; Dust Flame Propagation; Health Hazards; Deserts & Sand Movement; Hazard Potential of Heat-Transfer Fluids; Atmospheric Aerosols; Nano-technology.	8
	Total	40

References:

- Particulate Science & Technology, J.K. Beddow, Chemical Publishing Co., New York, NY, 1980.

