NPTEL Video Course - Mathematics - NOC:Modeling Transport Phenomena of Microparticles

Subject Co-ordinator - Dr. G.P. Raja Sekhar, Prof. Somnath Bhattacharyya

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Preliminary concepts
Lecture 2 - CauchyÂ s equation of motion and Navier-Stokes equations
Lecture 3 - Reduced forms of Navier-Stokes equations and Boundary conditions
Lecture 4 - Exact solutions of Navier-Stokes equations in particular cases
Lecture 5 - Dimensional Analysis Â Non-dimensionalization of Navier-StokesÂ s equations
Lecture 6 - Stream function formulation of Navier-Stokes equations
Lecture 7 - Stokes flow past a cylinder
Lecture 8 - Stokes flow past a sphere
Lecture 9 - Elementary Lubrication Theory
Lecture 10 - Hydrodynamics of Squeeze flow
Lecture 11 - Solution of arbitrary Stokes flows
Lecture 12 - Mechanics of Swimming Microorganisms
Lecture 13 - Viscous flow past a spherical drop
Lecture 14 - Migration of a viscous drop under Marangoni effects
Lecture 15 - Singularities of Stokes flows
Lecture 16 - Introduction to porous media
Lecture 17 - Flow through porous media Â elementary geometries
Lecture 18 - Flow through composite porous channels
Lecture 19 - Modeling transport of particles inside capillaries
Lecture 20 - Modeling transport of microparticles Â some applications
Lecture 21 - Introduction to Elctrokietics
Lecture 22 - Basics on Electrostatics
Lecture 23 - Transport Equations for Electrokinetics, Part-I
Lecture 24 - Transport Equations for Electrokinetics, Part-II
Lecture 25 - Electric Double Layer
Lecture 26 - Electroosmotic flow (EOF) of ionized fluid
Lecture 27 - EOF in micro-channel
Lecture 28 - Non-linear EOF, Overlapping Debye Layer
Lecture 29 - Two-dimensional EOF

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Lecture 30 - EOF near heterogeneous surface potential
Lecture 31 - Electroosmosis in hydrophobic surface
Lecture 32 - Numerical Methods for Boundary Value Problems (BVP)
Lecture 33 - Numerical Methods for nonlinear BVP
Lecture 34 - Numerical Methods for coupled set of BVP
Lecture 35 - Numerical Methods for PDEs
Lecture 36 - Numerical Methods for transport equations, Part-I
Lecture 37 - Numerical Methods for transport equations, Part-II
Lecture 38 - Electrophoresis of charged colloids, Part-I
Lecture 39 - Electrophoresis of charged colloids, Part-II
Lecture 40 - Gel Electrophoresis
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