

Multiscale Analysis (2019)

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Course Outline

Lect01 Introduction

Part 1: Background

Lect02 Analysis

Lect03 Probability Theory and Stochastic Processes

Lect04 ODEs

Lect05 Markov Chains

Lect06 SDEs

Lect07 PDEs

Part 2: Averaging

Lect08 Invariant Manifolds for ODEs

Lect09 Invariant Manifolds for ODEs: Convergence Theorem

Lect10 Averaging for Markov Chains

Lect11 Averaging for Markov Chains: Convergence Theorem

Lect12 Averaging for ODEs and SDEs

Lect13 Averaging for SDEs: Convergence Theorem

Part 3: Homogenization

Lect14 Homogenization for ODEs and SDEs

Lect15 Homogenization for SDEs: Convergence Theorem

Lect16 Homogenization for Elliptic PDEs

Lect17 Homogenization for Elliptic PDEs: Convergence Theorem

Lect18 Homogenization for Parabolic PDEs

Lect19 Homogenization for Parabolic PDEs: Convergence Theorem

Lect20 Homogenization for Linear Transport PDEs

Lect21 Homogenization for Linear Transport PDEs: Convergence Theorem

Reference: G. Pavliotis and A. Stuart, Multiscale Methods, Springer Science+Business Media, 2008.