

# NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Mechanical Engineering - Inverse Methods in Heat Transfer

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Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Introduction to inverse problems
- Lecture 2 - Fermi estimation
- Lecture 3 - Forward/Direct and Inverse problems
- Lecture 4 - Key drivers for studying inverse methods in engineering
- Lecture 5 - Formulation for inverse problems
- Lecture 6 - Statistical tools for estimation
- Lecture 7 - Statistical description of errors
- Lecture 8 - Well-posed and ill-posed problems
- Lecture 9 - Probability and Statistics Brief overview - I
- Lecture 10 - Probability and Statistics Brief overview - II
- Lecture 11 - Gaussian distribution
- Lecture 12 - Gaussian distribution (Continued...), and Maximum Likelihood Estimation (MLE)
- Lecture 13 - Linear least square regression
- Lecture 14 - Linear least square regression (Continued...)
- Lecture 15 - Alternatives to Linear least square
- Lecture 16 - Polynomial regression
- Lecture 17 - Inverse problems in transient conduction - I
- Lecture 18 - Inverse problems in transient conduction - II
- Lecture 19 - Non-linear regression
- Lecture 20 - Gauss-Newton algorithm (GNA)
- Lecture 21 - Gauss-Newton algorithm (GNA) Example
- Lecture 22 - Levenberg-Marquardt algorithm (LMA)
- Lecture 23 - Tikhonov regularization
- Lecture 24 - Jacobian and its calculation
- Lecture 25 - Bayesian methods
- Lecture 26 - Bayesian methods (Continued...)
- Lecture 27 - Metropolis-Hastings algorithm (MH) and Markov Chain Monte Carlo Methods (MCMC)
- Lecture 28 - Introduction to machine learning in heat transfer
- Lecture 29 - Overview of machine learning

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- Lecture 30 - Calculation in a neural network model
- Lecture 31 - Gradient Descent method
- Lecture 32 - Gradient Descent method (Continued...)
- Lecture 33 - Back propagation
- Lecture 34 - Neural network as a surrogate forward model
- Lecture 35 - PINN for an inverse problem
- Lecture 36 - PINN for an inverse problem (Continued...)
- Lecture 37 - Inverse methods in heat transfer - Summary