Applications of MATLAB for Researchers

Manish Pandey

Nepalese Society of Student Researchers (NSSR)

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Syllabus Overview

- **Date:** October 25, 2025
- **Duration:** 1–1.5 hours

Session Focus

Bridging theoretical learning with practical research implementation using MATLAB and Simulink.

1. Introduction to MATLAB for Research

- Importance of MATLAB in research workflows
- Overview of MATLAB and Simulink environment
- Research workflow:

$$\text{Data} \rightarrow \text{Model} \rightarrow \text{Simulation} \rightarrow \text{Analysis} \rightarrow \text{Publication}$$

2. Data Analysis & Signal Processing

- Importing and preprocessing research data
- Fourier Transform and filtering techniques
- Time–frequency analysis and visualization

3. Modeling & Simulation using Simulink

- Basic block diagrams for physical systems
- Dynamic system modeling (e.g., RC circuits, mass–spring systems)
- Running simulations through MATLAB commands:

MATLAB Command

```
sim('model')
```

4. Parameter Estimation & Curve Fitting

- Nonlinear model fitting using `fit` and `lsqcurvefit`
- Estimating physical parameters from experimental data
- Error analysis and model validation

Thank You!

Questions & Discussion