Computer analysis of automobile kinetic performance

Syllabus Number 1L208

Special Subjects
Elective 2 credit

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1. Course Description

The aim of this class is to deepen the understanding of the structure and performance of automobiles through practical training in MATLAB/Simulink. Students will learn the basic operation of MATLAB/Simulink, model the main parts of an automobile (car body, engine, suspension, etc.), and learn the methods of analyzing the structure of the various elemental machines and the motion performance of the vehicle through simulation. Students will also learn expression skills through presentation and report writing.
In this class, students will acquire knowledge and skills related to DP2 to DP5.

2. Course Objectives

The goal is for students to be able to do the following
- To be able to create simple programs in MATLAB.
- To be able to create models of suspension, body, engine, transmission, and driver characteristics, and execute them in MATLAB/Simulink.
- To be able to analyze and evaluate the various motions of a vehicle by changing the parameters of the above models.
- To acquire presentation skills and report writing skills.

3. Grading Policy

Students will create four major simulation models for the motion of a car. Students will then choose one of them and conduct a detailed parameter study. Students will be graded on one presentation (50%) and one report (50%) summarizing the results.

4. Textbook and Reference

Textbook
None

5. Requirements(Assignments)

Materials related to the lecture will be uploaded to the LMS in advance. Look at the lecture materials as preparatory study. Attend the lecture with a clear understanding of the outline of what you will learn in the lecture and clarify any points you do not understand (about 1.5 hours) .
After the lecture, read over the notes you took in the lecture to deepen your understanding. If there is anything you do not understand, ask questions in the next class (0.5 hours).

6. Note

7. Schedule

[1] Basic MATLAB operations, calculations, matrices
[2] Programming (branching, looping)
[3] Graphics
[4] Laplace transform and transfer function
[5] Time response of the system
[6] Basic Simulink operations
[7] Modeling and evaluation of suspension (Vertical motion)
[8] Frequency response
[9] Vehicle Steering Response Model and Evaluation (Lateral Motion)
[10] Modeling and evaluation of human-vehicle systems (Driver operation)
[11] Modeling and evaluation of engine characteristics and drive train (Longitudinal motion)
[12] Performance analysis practice
[13] Presentations
[14] Report writing practice
[15] Summary