Elements of Rocket Engineering

Syllabus Number 2B206
Basic Major Subjects
Elective Requisites 2 credit

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1. Course Description

The role and the fundamental of the rocket, which is used for many space projects, are lectured first. Various rockets and rocket engines in the world are introduced and the characteristics of them are shown. And the overview of the system, subsystems and performance for the rocket engine, especially the liquid-propellant rocket engine(ex. the first stage engine LE-7A of Japanese rocket H-2A), are studied.
Students will have the knowledge and techniques related to DP2.
This lecture is taught by teachers with practical experience. The teacher has been involved in the rocket engine development work at a company. In class, explanation and discussion etc. will be held based on actual example and actual experiences at the company and topics at the site.

2. Course Objectives

The target of this course is to understand the concept of the system, subsystem and performance for the rocket and the liquid-propellant rocket engine.
And this course aims to understand the actual rocket and rocket engine products by figures, pictures and movies.

3. Grading Policy

Evaluation will be done referring regular test. Answer of the test will be explained individually.

4. Textbook and Reference

Textbook
No text is used.
Reference
Materials including figures, pictures and movies are indicated on slide.
These will be presented by LMS.

5. Requirements(Assignments)

Preparation (about 1.5 hour);The materials used in the lesson will be presented beforehand through LMS, so please read them and do research by yourself which you do not understand and deepen your knowledge about rocket. Please also summarize what you do not understand in a notebook and ask questions by writing on a paper distributed every lesson.
Review (about 1.5 hour); The materials used in the lesson are presented by LMS, so please use them for review about function, performance, and formulas equation of rocket. And also answer of exercises will be presented by LMS, so please become able to calculate rocket performance.

6. Note

The contents of the lesson may be changed according to the progress.

7. Schedule

[1] Overview of the rocket
[2] Overview of the rocket engine
[3] Principle of liquid-propellant rocket engine
[4] Performance of liquid-propellant rocket engine and sample calculation exercise
[5] Cycles of liquid-propellant rocket engine
[6] System of liquid-propellant rocket engine
[7] System of staged combustion cycle (LE-7)
[8] Fabrication of staged combustion cycle (LE-7)
[9] Overview injector of liquid-propellant rocket engine
[10] Design for injector of liquid-propellant rocket engine
[11] Design for the combustion chamber of liquid-propellant rocket engine
[12] Sample calculation exercise of performance of the combustion chamber of liquid-propellant rocket engine
[13] Design and sample calculation exercise of performance of the nozzle of liquid-propellant rocket engine
[14] Overview of turbopump of liquid-propellant rocket engine
[15] Performance of turbopump and overview valve of liquid-propellant rocket engine