Numerical Calculations

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1. Course Description

Students deal with exercises after teacher explains following contents. Students deepen their own comprehension by comparing numerical calculation results with analytic results.
1. simultaneous equations, determinant
2. ordinary differential equation
3. finite element method
Students can acquire knowledge about DP1 and DP2 in this class.

2. Course Objectives

Goal of this class is that students acquire ability to solve the problems with numerical simulations which is necessary for scientific and technological researcher and engineer. Of course, analytic results are basic and important. But, in case of real problems, there are many cases we do not get analytic results because of complexity of the problems. Numerical simulation is a method to get approximate solution instead of analytic results. Students can understand numerical simulation and apply to various problems in this class.

3. Grading Policy

Attendance more than two thirds, seven exercises (100%).
The students will get simple explanations after these exercises.

4. Textbook and Reference

Textbook
Text : ISBN978-4901683708

5. Requirements(Assignments)

Read the text within the contents of the next lecture and write in a notebook for preparation in order to cope with exercises teacher explains in the class (1.5 hours).
After the lecture will be ended, practice these exercises with use of computer in order to review (1.5 hours).

6. Note

7. Schedule

[1]	Solution method of simultaneous equations and determinant (1)
[2]	Exercise (1) : calculation of determinant, in CL class
[3]	Solution method of simultaneous equations and determinant (2) : Gaussian elimination (direct method)
[4]	Exercise (2) : calculation of simultaneous equations (Gaussian elimination), in CL class
[5]	Solution method of simultaneous equations and determinant (3) : Jacobi method (iteration method)
[6]	Exercise (3) : calculation of simultaneous equations (Jacobi method), in CL class
[7]	Solution method of simultaneous equations and determinant (4) : Gauss-Seidel method (iteration method)
[8]	Exercise (4) : calculation of simultaneous equations (Gauss-Seidel method), in CL class
[9]	Ordinary differential equation (1) : Euler method
[10]	Exercise (5) : calculation of ordinary differential equation (Euler method), in CL class
[11]	Ordinary differential equation (2) : Runge-Kutta method
[12]	Exercise (6) : calculation of ordinary differential equation (Runge-Kutta method), in CL class
[13]	Finite element method : basic of finite element method
[14]	Exercise (7) : calculation of basic of finite element method, in CL class
[15]	Summary, in CL class