

有限元素法特論 Special Topics on Finite Element Method

Introduction:

This course is not designed to introduce the basic principle and coding skills of Finite Element Method. Instead, it is assumed students already possess some familiarity with numerical methods and concepts of FEM. Thus quick review on basic numerical methods for solving initial value problems of 1-D single and system ODE, boundary value problem of 2nd and higher order ODE, 2D Laplace, Heat equations are proceeded in class. Then emphasis is put on the use of existing softwares, such as Comsol Multiphysics, Ansys Multiphysics, for solving multiphysics problems.

Course Contents

1. Introduction to numerical methods for solving ODE and PDE
2. Weighting residual method and variational principle for solving ODE and PDE
3. Introduction to Comsol Multiphysics, Ansys Multiphysics
4. 1-D Finite Element solution to ODE
5. 1-D Finite Element solution to 1-D heat equation & 1-D wave equation
6. Selected topics of multiphysics on : fluid solid interaction problem, stress analysis and cooling problem on electronic packaging, vibration problem of piezoelectric plates, stress analysis of Flexible OLED, numerical simulation on biosensor, micropump, micromixer,....

Ref:

1. Gouri Dhatt and Gilbert Touzot, 1982. The Finite Element Method Displayed. John Wiley & Sons.
2. Comsol Multiphysics, Online manual, v3.5a.
3. Ansys Multiphysics, Online manual, v11.
4. R.D. Cook, 1982. Concepts and Application of Finite Element Analysis. John Wiley & Sons.

Grading Policy:

HomeWork 20%

Mid-Term Project 40%

Final Term Project 40%