FEM for 1D problems

Introduction

Remarks

Language

- Relevant and recent publication in FEM are in english language → Good to learn
- Therefore: Notes in english, explanation in german
- Suggestion: Create little dictionary

We start with a 1D problem

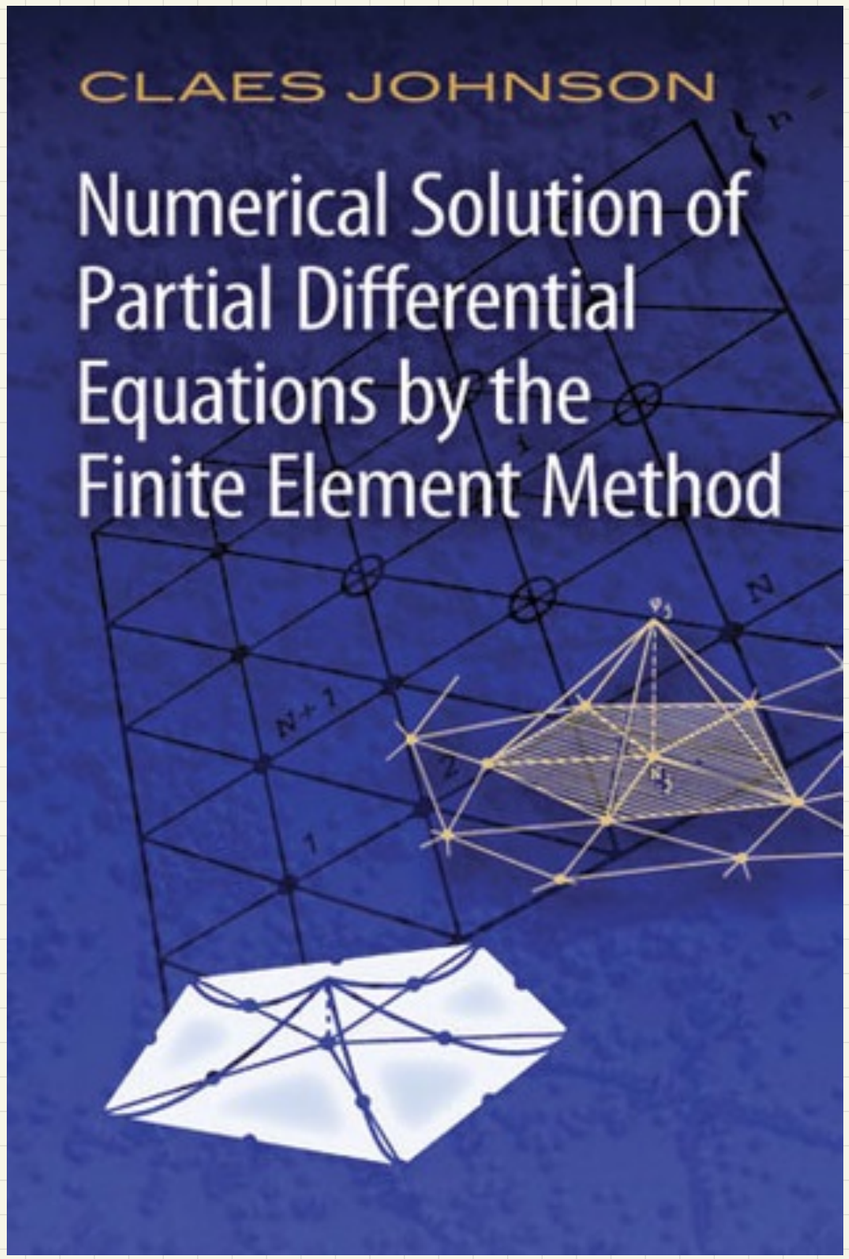
- Ordinary differential equation, not partial
- Advantage: Much simpler than 2D/3D
- Basic ideas are the same

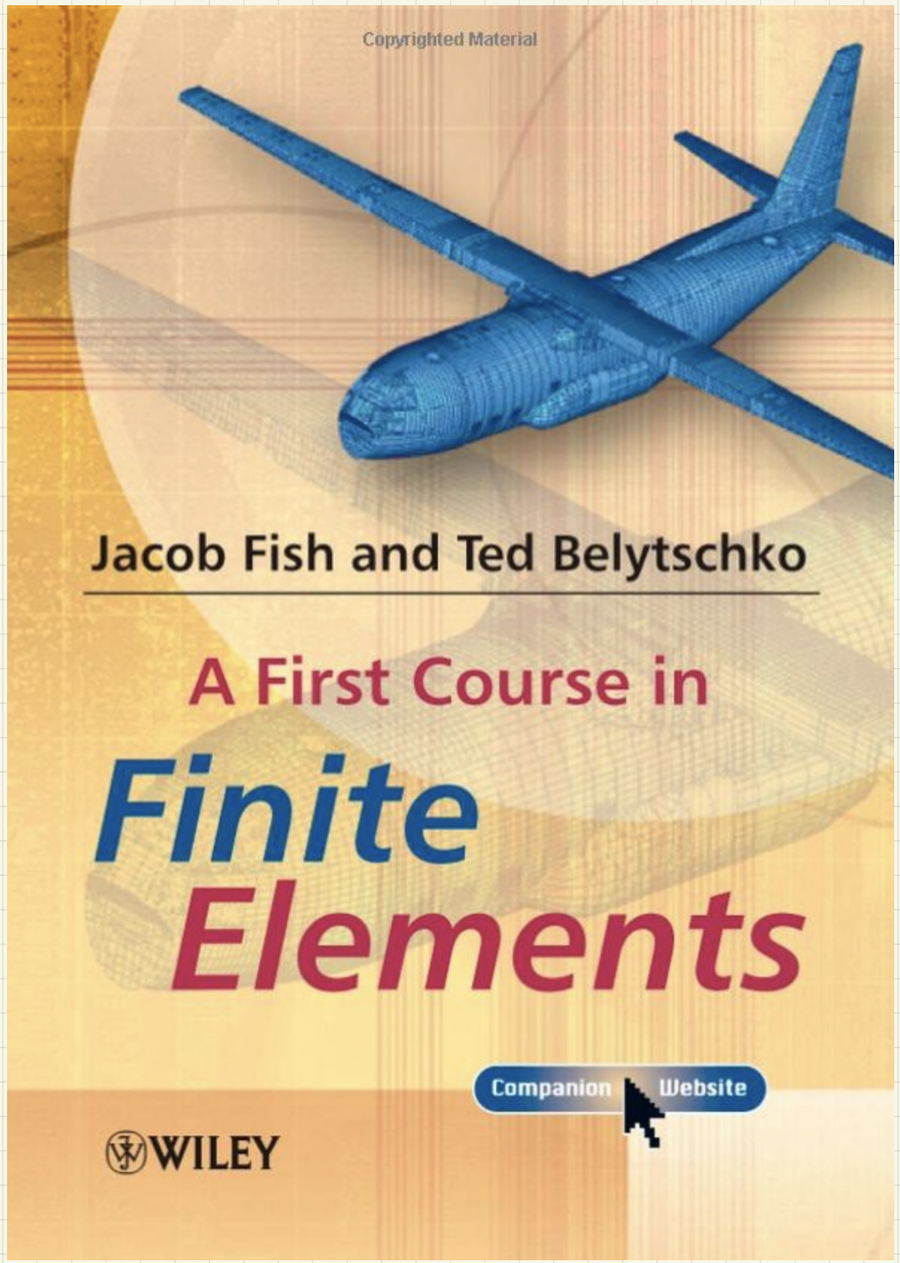
Pile foundation

Sonatus building, Saigon

Construction site 2010

Books


CLAES JOHNSON
Numerical Solution of Partial Differential Equations by the Finite Element Method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Jacob Fish and Ted Belytschko
A First Course in
Finite Elements
Companion Website
WILEY

Ingredients of finite element solution

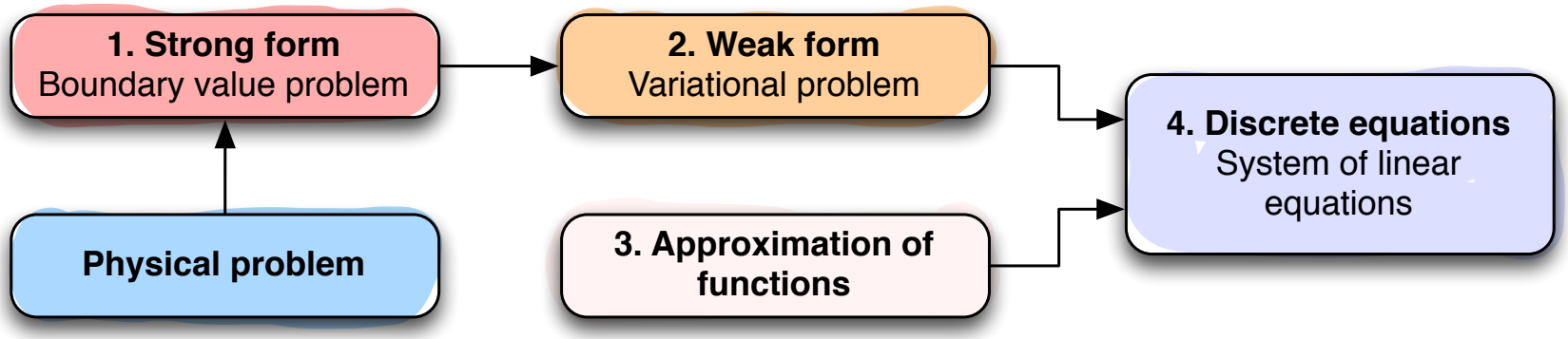

Diagram according to Fish and Belytschko, 2007

Strong form: Mathematical model of real world process, differential equation and boundary conditions

Weak form: Basis for finite element solution

Approximation of functions: Construct approximate solution by combining predefined functions

Discrete equations: Inserting predefined functions into weak form yields linear system of equations

It's only math once the boundary value problem has been formulated!