

MA3227 Numerical Analysis II

Lecture 0: Introduction

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Introduction

Instructor

Simon Etter, ettersi@nus.edu.sg

Office hours by appointment.

Any feedback is very welcome!

Please do let me know if you struggle, have questions, etc.

Assessment

- ▶ 20% four homework assignments
- ▶ 30% midterm exam
- ▶ 50% final exam (covers entire module)

Lab sessions

- ▶ Solve a small programming assignment while I am around to help with any issues that you may face.
- ▶ Does not contribute to your final mark, but very important opportunity for you to learn and practise!

Introduction

Numerical analysis

Solving mathematical problems with the help of a computer.

Topics in this module

- ▶ Partial differential equations (brief)
- ▶ Large, sparse linear systems of equations
- ▶ Nonlinear systems of equations (brief)
- ▶ Ordinary differential equations
- ▶ Monte Carlo methods for high-dimensional problems

Introduction

Partial differential equations / large, sparse linear systems

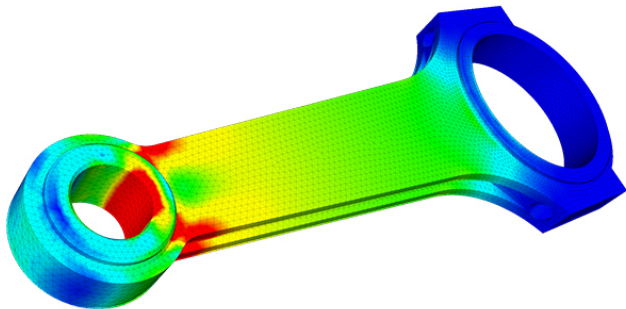


Image source:

<https://www.simscale.com/blog/2016/10/what-is-finite-element-method/>

Introduction

Ordinary differential equations



Image source:

<https://pixabay.com/photos/rocket-launch-night-trajectory-693236/>

Introduction

High-dimensional problems

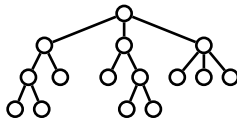
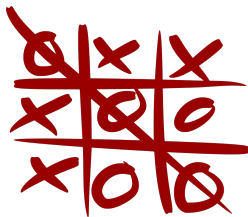


Image source: <https://en.wikipedia.org/wiki/Tic-tac-toe>

See also <https://www.google.com/search?q=tic+tac+toe>

Introduction

Programming language

- ▶ Both class, lab assignments and homework sheets will require you to be familiar with the Julia programming language.
- ▶ Julia offers many advantages compared to more well-known alternatives like Matlab or Python:
 - ▶ Modern and maths-friendly syntax.
 - ▶ Many state-of-the-art packages are easily available.
 - ▶ It is free to use even after you graduate.
 - ▶ Loops and functions are fast.
- ▶ Julia is non-negotiable: you will have to learn Julia to pass this class. (Sorry about this, but any other solution would be worse.)
- ▶ An introduction to Julia is provided on the module website. There will be a “Getting started with Julia” session on Wednesday, 15 Jan 2019, 9-10am in S17-04-06. (Same time slot and venue as the lab).