Introduction

Elena Celledoni and **Brynjulf Owren**

Atlantic Association for Research in the Mathematical Sciences - SUMMER SCHOOL

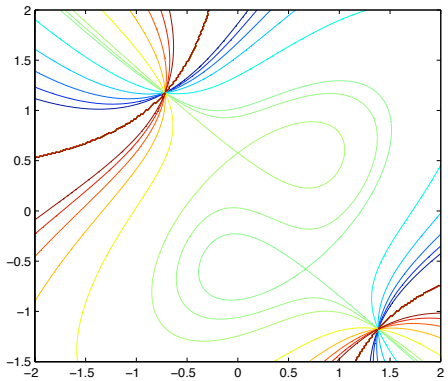
Structure-preserving discretization of differential equations

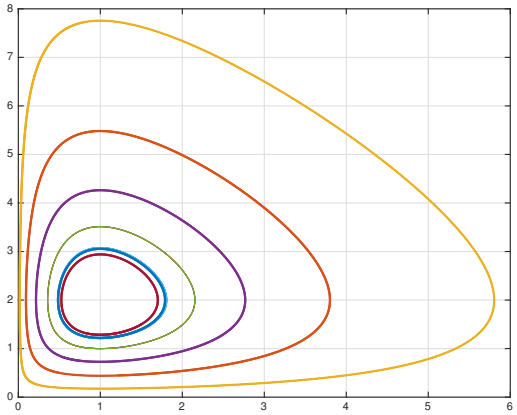
Lecturers

Figure : http://www.ntnu.edu/employees/elena.celledoni, http://www.ntnu.edu/employees/brynjulf.owren

Research interests

- numerical integration of time dependent differential equations (ODEs and PDEs)
- geometric numerical integration





- structure preserving algorithms
- Lie group integrators
- preservation of energy and first integrals under numerical discretization

Organization of the course

- Monday to Thursday lectures in DUNN building room 117, from 15:30 to 17:30 (with a break after 45 min)
- Friday: supervision of the assignments in DUNN building room 301, 15:30 to 17:30.
- One assignment per week for the first three weeks.
- One final test.
- The three assignments and the final test count each for $\frac{1}{4}$ of the credits for the course.

Webpage of the course

https://wiki.math.ntnu.no/aarms2015/

- Main page
  1. messages
  2. general description
  3. learning outcome
- List of lectures
  1. link to each lecture
  2. with a description and teaching material
- Assignments
  1. Three assignments one per week.

Learning outcome

Knowledge: *Strucure preserving and geometric numerical integration of differential equations (mostly ODEs but also PDEs).*

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Abilities:

- ability to choose a suitable geometric numerical method depending on the problem to be solved;
- ability of analyzing the effect of using structure preserving integrators;
- ability to implement the methods and test their properties for some simple test problems.

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General competence:
Increased knowledge and experience in the field of numerical analysis of differential equations.

Learning methods

1. Lectures.

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3. Activities in working groups: exercises, proofs.
4. Other.

Questionnaire

Purpose:

Questionnaire

Purpose:

1. Find out about the knowledge background of the class (both regarding background theoretical knowledge and programming experience).
2. Compose working groups with different expertise (so that the group members can learn from each other).