

MATH-610(II) **Elastic Rods and Birods II (2018)**

Maddocks John H.

| Cursus | Sem. | Type |
|-------------|------|------|
| Mathematics | | Obl. |

| | |
|----------------------------|-------------------|
| Language of teaching | English |
| Credits | 1 |
| Session | |
| Exam | Oral presentation |
| Workload | 30h |
| Hours | 20 |
| Courses | 15 |
| Exercises | 5 |
| Number of positions | |

Remark

Next time: 3-7 June 2019

Summary

Long slender structures are ubiquitous: wires, cables, ropes and plant tendrils are macroscopic examples. At the micro scale, nanotubes, microtubules, actin filaments and DNA are other cases. These lectures develop the theories of elastic rods and birods which are necessary to model such structures

Content

Specialised Topics in Rod Mechanics:

- 1) Bifurcation and Stability of equilibria, including symmetry breaking from integrable cases and non-isolated equilibria.
- 2) Homogenization of systems with rapidly varying coefficients, e.g. high intrinsic twist.
- 3) Rods constrained to, and interacting with surfaces – the impetus estimation approach.
- 5) Rods in a heat-bath, equilibria distributions, Laplace method for estimating probability and connection to Jacobi fields and their Hamiltonian formulation.

Note

Exam will involve oral presentation of a research article in specialised area of rod mechanics

Keywords

Mechanics of rods and birods

Learning Prerequisites**Required courses**

Undergraduate core courses in Analysis, Linear Algebra and Numerical Analysis, Elastic Rods and Birods I

Learning Outcomes

By the end of the course, the student must be able to:

- Use the theory of rods in the analysis and computation of various modelling problems

Resources**Bibliography**

Given in class