MATH-478 **Dispersive PDEs**

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Cursus	Sem.	Type
Ing.-math	MA2, MA4	Opt.
Mathématicien	MA2	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Oral
Workload	150h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This course will give an introduction to some aspects of nonlinear dispersive partial differential equations. These are time evolution problems that arise in many contexts in physics, such as quantum mechanics, electrodynamics, fluid motion and relativity.

Content

The course is aimed to be self-contained, introducing the necessary technical tools along the way.
1. Introduction. What are dispersive equations? How do they arise?
2. Technical Background: Fourier Analysis & Sobolev Spaces
3. Linear Dispersive Equations
4. Semilinear Equations
4.1 Local Theory
4.2 Criticality and Scaling
4.3 Global Theory
4.4 Advanced Topics / More Technical Background
5. Quasilinear Equations
5.1 Method of Spacetime Resonances
5.2 Advanced Topics

Learning Prerequisites

Required courses

A solid foundation in analysis (including measure theory and functional analysis) is necessary. Advanced topics such as harmonic analysis would be helpful, but are by no means required.

Assessment methods

Active participation in the exercise sessions
Oral final examination
Dans le cas de l'art. 3 al. 5 du Règlement de section, l'enseignant décide de la forme de l'examen qu'il communique aux étudiants concernés.