TURBULENCE AND ASSOCIATED ASPECTS OF PDES AND GEOMETRIC MEASURE THEORY

Class meets on Mondays at 16:15–18:00 in HG D 3.2.

1. Structure

1.1. **Exercises.** Exercises pertaining to the lectures will be posted every 2-3 weeks. Students may discuss the exercises during office hours after the lectures. Additional office hours can be requested via email.

Exercises will not count towards the final grade; however, doing them is highly encouraged and will be helpful for the exam.

1.2. **Exams.** There will be an oral final exam for the course.

2. Schedule

	Date	Topics
V	17.2 & 24.2	Preliminaries on the incompressible Euler and Navier-Stokes equations. Basics on Hölder, Sobolev, and Besov spaces. Notions of Hausdorff and Minkowski dimension. Physics motivation: K41 theory of turbulence.
V	3.3	Preliminaries on Wavelets. On the Duchon-Robert measure. Physics motivation: Intermittency.
S	10.3	Overview of advances topics and motivations. Start on Laplace eigenfunctions.
S	17.3 & 24.3	Level sets of Laplace eigenfunctions on manifolds, apres Logunov-Malinnikova.
V	31.3 , 7.4 , & 14.4	Preliminaries: Frostman lemma, capacity, etc. GMT of random fields, projection of measures, (the X-ray transform), dimension of level sets and graphs of rough functions.
	21.4 & 28.4	No class: Easter and Sechseläuten resp.
S	5.5	Construction of functions with prescriben structure function exponents, apres Jaffard.
V	12.5 , 19.5 & 26.5	Energy conservation results: Constantin-E-Titi, Duchon-Robert, local K41 theory apres Eyink and Novack, and intermittency and support of energy dissipation measures, apres De Rosa-Isett and De Rosa-Drivas-Inversi.