2015/2016, Term 2. MATH 515:201
Partial Differential Equations of Fluid Mechanics

This course is an introduction to the mathematical theory of fluid mechanics.

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Class hours: Mon Wed Fri 10:00–11:00 Math Annex 1102

Tentative Course Outline:

- Introduction of Euler and Navier-Stokes equations; Symmetry groups and conserved quantities; Vorticity and some exact solutions; Leray's formulation and Hodge decomposition;
- Vorticity–Stream formulation of Euler and Navier-Stokes; Energy methods; Local and global theory; Axisymmetric flows;
- Weak solutions; elliptic vortices; vortex patches; Yudovich theory;
- Further developments: Vortex sheets; Kelvin-Helmoltz instability; Young measures

References: A number of books will prove useful, but our basic references are: 1) A Mathematical Introduction to Fluid Mechanics by Chorin and Marsden 2) Vorticity and Incompressible Flow, by Majda and Bertozzi.

Grading: is based on homework assignments and class participation.