PolyU-PDE Seminars

Prof. Francesco Fanelli

Basque Center of Applied Mathematics, Spain

Topic 1
Recent trends in the analysis of fast rotating fluids

Date| Time
13 January 2025 (Monday) | 17:00 – 18:00 (HK Time)

Meeting ID | Password
893 9276 6852 | 0113

Zoom Link
https://polyu.hk/GUtQC

Abstract:
In this talk, we survey recent results for a class of singular limit problems arising in the study of geophysical flows. The main feature of the considered models is represented by the presence of a term encoding the action of the Coriolis force, possibly in interaction with other forces which are relevant in this context, like the gravity and the centrifugl force.
We show the rigorous derivation of reduced models in the low Rossby number (i.e. fast rotation) regime, by focusing on the dynamics in the bulk and neglecting boundary effects. In passing, we discuss several important aspects of this study, like, for instance, the assumption of compressibility, or incompressibility, of the fluid, and the presence of multiple scales.

Topic 2
Emergence of Ekman boundary layers for fluids in fast rotation

Date| Time
22 January 2025 (Wednesday) | 17:00 – 18:00 (HK Time)

Meeting ID | Password
849 0548 4559 | 0122

Zoom Link
https://polyu.hk/oqiGR

Abstract:
In this talk, we study boundary effects linked with the dynamics of a fluid in the regime of fast rotation. We show the appearance of boundary layers, the so-called Ekman layers, close to the horizontal boundaries (top and bottom layers of the ocean, or of the atmosphere, for instance), and present the main consequences of this boundary phenomenon on the global dynamics of the fluid. In passing, we also discuss the role of the geometry of the domain's boundary in this kind of studies (topography effects).

ALL ARE WELCOME