A U S H A N G

FREIE UNIVERSITÄT BERLIN
Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

D I S P U T A T I O N

Freitag, 08.09.2023, 09:00 Uhr

Ort: Seminarraum 031
(Fachbereich Mathematik und Informatik, Arnimallee 6, 14195 Berlin)

Disputation über die Doktorarbeit von

Herrn Abhishek Paraswara Harikrishnan

Thema der Dissertation:
Geometry and dynamics of coherent structures in the stably stratified atmospheric boundary layer

Thema der Disputation:
Direct observation of vortex reconnection in turbulent flows

Die Arbeit wurde unter der Betreuung von **Prof. Dr. N. Vercauteren** durchgeführt.

Abstract: Vortex reconnection is the process where two vortices approaching closely cut and connect to each other. In their recent review paper, Yao and Hussain (2022) described vortex reconnection as a "fundamental event of topological change" and is believed to play an important role in the turbulence cascade, fine-scale mixing and aerodynamic noise generation. With direct numerical simulation of antiparallel vortex tubes, it has been shown that a rapid increase in both Enstrophy (which is the volume integral of the square of vorticity) and maximum vorticity magnitude occurs as the tubes move closer, generating small scales while undergoing intense vortex stretching. This rapid increase in vorticity magnitude is suggested to be linked to the formation of finite-time singularities. In this talk, I will motivate and introduce the topic of vortex reconnection, its mechanism and discuss a recently developed method to directly identify vortex reconnection in numerical and experimental turbulent flow data which exploits the observation that the ordering of Enstrophy components change during reconnection. Further, I will discuss a possible route to identifying singularities by examining the downscale energy transfer towards scales below the Kolmogorov scale at the plane of reconnection. Yao, J., & Hussain, F. (2022). Vortex reconnection and turbulence cascade. Annual Review of Fluid Mechanics, 54, 317-347.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

Interessierte werden hiermit herzlich eingeladen

Die Vorsitzende der Promotionskommission
Prof. Dr. N. Vercauteren