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Nader Masmoudi received his BS in Mathematics from the École Normale Supérieure Paris in 1996, his PHD from Paris Dauphine University in 1999 and his HDR in 2000. He was a CNRS researcher from 1998 till 2000. Since 2000, he is a Professor at the Courant Institute of Mathematical Sciences at New York University. He is currently spending few years at NYUAD in Abu Dhabi as an affiliated faculty where he is the director of the center Stability, Instability and weak turbulence.

His research lies in the iterface between fluid mechanics, partial differential equations and dynamical system. His honors include a gold medal at the International Mathematic Olympiads in 1992, a Sloan Fellowship from 2001 to 2003, a Senior Clay Math Scholar in 2014, a chair of excellence from the Foundation Sciences Mathématiques de Paris from 2016 to 2018, a chair position from the Institut des hautes études scientifiques in Paris from 2018 to 2020. He was the recipient of the Fermat prize in 2017, of the Kuwait prize in 2019 of the King Faisal Prize in Sciences in 2022. He was elected to the the American Academy of Arts and sciences in 2021.

Title: Prandtl System: Reversed flows and the Zero Viscosity Limit

Abstract: The Prandtl system describes the flow in the boundary layer that forms near the boundary when taking the inviscid limit in the Navier-Stokes system. It was first derived in 1904 by Prandtl. Many important questions related to the Prandtl system and the inviscid limit are still open. We will review some recent advances in the study of the well-posedness of the Prandtl system, the separation of the boundary layer, as well as the study of the inviscid limit of the Navier-Stokes system.

Reversal flows occur after the separation, and are characterized by regions in which the velocity changes sign. The classical point of view of regarding the stationary Prandtl system as an evolution equation in the horizon variable x completely breaks down. Instead, we view the problem as a quasilinear, mixed-type, free-boundary problem.

This is a joint work with Sameer Iyer.