JOHNS HOPKINS
Center for Environmental & Applied Fluid Mechanics

SPRING 2021 CEAFM VIRTUAL SEMINAR

"The Onset of Turbulence in Shear Flows - A Matter of Life and Death"

Presented by Prof. Björn Hof

Institute of Science and Technology, Austria

Hosted by Rui Ni (JHU - MechE)

In pipe, channel and Couette flow turbulence arises despite the linear stability of the laminar state and the transition is caused by finite amplitude perturbations. In the vicinity of the critical point turbulence is not space filling but appears in localized patches. Although the lifetime of individual patches is finite, prior to decay they may infect adjacent laminar regions and proliferate. Depending which of these processes dominates, eventually either the entire flow will relaminarise or turbulence survives. This overall situation is reminiscent to absorbing state phase transitions in statistical mechanics. As shown specifically for Couette flow the transition falls into the directed percolation universality class. In order to resolve the relevant time scales of the flow and to determine the respective critical exponents, experiments with excessively large aspect ratios and observation times are required. In addition I will discuss further complications that arise in pressure driven flows such as pipes and channels.

Friday, January 29, 2021 at 3:00 PM

https://wse.zoom.us/j/93762992307