

CAUSALITY IN RAYLEIGH-BÉNARD AND TAYLOR-COUETTE TURBULENCE

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The Rayleigh-Bénard (RB) and Taylor-Couette (TC) systems have always been the drosophila of physics of fluids, with various concepts in fluid dynamics such as stability, pattern formation, transition to turbulence, transitions in the boundary layer, or transport properties being tested with these well-defined flows with well-known underlying dynamical equations and boundary conditions. We think that RB and TC are excellent playgrounds to also test new ideas on causality in turbulence and to better understand what one can learn when asking questions on observed effects and underlying causes.

Examples are about the connection between the number of observed large-scale rolls in these systems and the aspect ratio, about flow reversals and how they depend on the control parameters, about multiple co-existing turbulent states, and about the effects of plate roughness on the turbulent transport properties of the flow.

I will try to elucidate the questions formulated in the flyer of the workshop in the context of these examples, which are all current research questions in the field of RB and TC turbulence.