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**From convection rolls to finger convection in double-diffusive turbulence**[1] YANTAO YANG, Physics of Fluids Group, University of Twente, ROBERTO VERZICCO, Dipartimento di Ingegneria Industriale, University of Rome "Tor Vergata", DETLEF LOHSE, Physics of Fluids Group, University of Twente — The double diffusive convection (DDC), where the fluid density depends on two scalar components with very different molecular diffusivities, is frequently encountered in oceanography, astrophysics, and electrochemistry. In this talk we report a systematic study of vertically bounded DDC for various control parameters. The flow is driven by an unstable salinity difference between two plates and stabilized by a temperature difference. As the relative strength of temperature difference becomes stronger, the flow transits from a state with large-scale convection rolls, which is similar to the Rayleigh-Bénard (RB) flow, to a state with well-organised salt fingers. When the temperature difference increases further, the flow breaks down to a purely conductive state. During this transit the velocity decreases monotonically. Counterintuitively, the salinity transfer can be enhanced when a stabilising temperature field is applied to the system. This happens when convection rolls are replaced by salt fingers. In addition, we show that the Grossmann-Lohse theory originally developed for RB flow can be directly applied to the current problem and accurately predicts the salinity transfer rate for a wide range of control parameters.

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