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Buoyancy-suppressed transition in vertical pipe flow ASHLEY WILLIS, University of Sheffield, ELENA MARENSI, IST Austria, SHUISHENG HE, University of Sheffield — In many heating and cooling systems, the presence of turbulence in the flow is essential for effective heat transfer. The heat transfer itself, however, can 'destabilise' the turbulence. In a vertical heated pipe, as heat transfer is increased, shear-driven turbulence can undergo a sudden laminarisation either to a simple parabolic flow or to a relatively quiescent convection-driven state.
In this work, we consider the transition from shear-driven turbulence, initially in the dynamical systems context involving linear stability and invariant solutions. While certain nonlinear solutions are closely related to transition *to* turbulence, their relationship with transition *from* turbulence is more difficult to pin down. These solutions are clearly observed to be suppressed, but direct observations of the nature of roles of streaks in the heated flow is more revealing in determining the origin of turbulence suppression.

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