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Unusual dynamics of convection in the Sun KATEPALLI SREENIVASAN, New York University, JOERG SCHUMACHER, Technical University, Ilmenau, Germany — Turbulent convection in the Sun, which is the dominant mode of heat transport outwards of 70 percent of its radius, differs in nearly all its aspects from convection processes known on Earth, certainly those under controlled laboratory conditions, thus seriously challenging existing physical models of convective turbulence and boundary conditions. Solar convection is a multiscale-multiphysics phenomenon including the transport of mass, momentum and heat in the presence of rotation, dynamo action, radiation fluxes and partial changes in chemical composition. Standard variables of state such as pressure, mass density, or temperature vary over several orders of magnitude thus generating a highly stratified flow. Yet, it is useful to attempt to shed some light on these results with a view to gaining a deeper understanding of dynamical aspects of solar convection. In particular, we discuss characteristic scales and dimensionless parameters from the perspective of turbulent convection in laboratory conditions, a research field that has rapidly progressed in the last few decades. Our estimates and calculations are mostly based on the standard solar model.

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