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On the transition to turbulence problem

In this talk we systematically discuss the key points advocated in the literature by various schools of thought and relate them to the known rigorous facts about the Navier–Stokes equations and to the well-established rigorous mathematical frameworks. Besides providing a coherent story from the analysis point of view, we also discuss two main pillars upon which the current discussion in the literature is based, namely the crucial effect of non-normality of the linear operators and the energy-conserving nature of the nonlinear terms. Finally, we propose alternative ways to make a progress on this long-standing problem.