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The Complex Nature of Turbulence Transition in Boundary Layer Flow JIM CHEN, CHEN WEIJIA, Nanyang Technological University — Turbulence transition is the process where a laminar field evolves to become turbulent, signaled by the presence of random oscillations. To fully understand turbulence transition demands thoughtful and interconnected consideration of three elements that describe its nature, its physics, mathematics, and numerical simulation. They are interdependent, mutually illuminating elements that form a problem of awe-inspiring complexity. They also examine the problem from a spectrum of perspectives. First, a far-sighted perspective is needed that views the overall problem in its macroscopic, general terms such as its experimental settings, governing equations and boundary conditions. Accompanying it is a precision-oriented, detail-solicitous view of minute, microscopic intricacies such as small-scale turbulence vortices and infinitesimal instability wave interactions that transpire in the flow. The capacity and tolerance to switch between varying degrees of these orthogonally-oriented perspectives is necessary to systematically break down this problem. This study demonstrates a deconstruction of the phenomenon of turbulence transition in order to gain an appreciation of its very complex nature.

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