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Absolute mode of instability and transition toward turbulence in a rotating boundary layer BERTRAND VIAUD, CReA, ERIC SERRE, CNRS MSNM-GP, JEAN-MARC CHOMAZ, CNRS LadHyX — The three dimensional boundary layer over a rotating disk is accordingly subject to an absolute mode of instability, whose role in transition process is still not well understood. Depending upon the methods of investigation and the associated assumptions, the scenario for the last stage of transition appears either convectively or absolutely dominated (see Davies & Carpenter [J. FLUID MECH. 486 287 2003] and Pier [J. FLUID MECH. 487 315 2003]). Here, high accuracy spectral D.N.S. has been applied to two co-rotating disks with a forced inflow above the expected critical Reynolds for the convective/absolute transition. Computations bring new information on the transition process, as the sustained existence of a global non-linear mode is shown, and give insight into how non-linear effects work. Progressive broadening of the spectrum is followed by sudden evolution toward very small scales as time goes on. Moreover, the presence of an absolute mode appears clearly to be a prerequisite to turbulence, and a rich description of its spectrum content is needed to achieve transition.

Bertrand Viaud
CReA

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