

# Edge states in boundary layer flows

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## ABSTRACT

Subcritical transition to turbulence is intrinsically linked to the concept of edge states, i.e. relative attractors for phase-space trajectories evolving along the boundary of the basin of attraction of the laminar state [1]. In the recent years, edge states have been computed in cylindrical pipe flow, plane Couette flow and square duct flow, all of them open internal flows (see e.g. [2]). Here we extend the concept of edge states to external flows also displaying by-pass transition, in particular boundary layer flows. We will show edge state computations in the Asymptotic Suction boundary layer (ASBL), a parallel realisation of a boundary layer flow [3]. The emphasis will be on the influence of the numerical domain on the dynamics, the localisation properties of these states and the occurrence of hairpin vortices. These computations culminate in the first computation of a fully localised edge state for the Blasius boundary layer flow, taking into account the spatial development of the boundary layer. This complete comparative study serves as a guideline to isolate and understand the various mechanisms at play during by-pass transition in spatially evolving flows.

## REFERENCES

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