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The combined effect of internal and external intermittency in turbulent jet flows[1] MICHAEL GAUDING, YACINE BRAHAMI, LUMINITA DANAILA, EMILIEN VAREA, CORIA — The combined effect of internal and external intermittency on the statistical properties of small-scale turbulence is investigated in a temporally evolving, planar turbulent jet flow. In turbulent jet flows, the phenomenon of external intermittency originates from a very thin layer, known as turbulent/non-turbulent interface, that separates the inner turbulent core from the outer irrotational surrounding fluid. The impact of external intermittency on small-scale turbulence is studied across the jet by the self-similarity solution of higher-order structure functions. It is shown that the scaling of structure functions exhibits a growing departure from the prediction of classical scaling solutions toward the edge. Empirical evidence is provided that this departure is primarily due to external intermittency and the associated break-down of self-similarity. By conditioning structure functions on an external intermittency parameter, it is shown that the self-similarity solution of structure functions can be recovered. The analysis is based on highly resolved direct numerical simulations.

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