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Small scale isotropy and universality of axisymmetric jets CARLO MASSIMO CASCIOLA, FRANCESCO PICANO, University of Rome "La Sapienza" — Self-similarity is a fundamental phenomenology in turbulent flows, see e.g. the law of the wall near solid boundaries. In certain cases it can be extended to universality, e.g. each zero pressure gradient turbulent boundary layer is identical, despite differences in the transitional phases. In these conditions, the longstanding debate about jets and their far-field universality comes as no surprise. The initial ansatz of a universal spreading rate is inconsistent with more accurate and recent measurements where the scatter in the opening angle is found to exceed the experimental accuracy, implying a true lack of universality in these basic quantity. A universal scaling theory may still be proposed by including the spreading rate in the similarity transformations. We will show that this approach leads to a conflict with the presumed recovery of isotropy in the dissipative scales of the flow. Finally we will show why we expect isotropy to be recovered to conclude that axisymmetric jets cannot be universal, unless the spreading rate is universal itself. The issue is supported by means of two direct numerical simulations of free axisymmetric jets with different inlets and by experimental data available in the literature.

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