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Dependence of higher-order passive-scalar structure functions on the scalar-field initial conditions[1] JASON LEPORE, LAURENT MYDLARSKI, McGill University — To investigate the dependence of structure function scaling exponents of a turbulent passive scalar on the (scalar-field) initial conditions, higher-order structure functions of temperature are measured in the turbulent wake of a circular cylinder ($R_\lambda = 388$). The turbulent scalar field is generated by two different means. It is first created by heating the cylinder. It is then produced using a mandoline.[2] Though the second-order statistics (*e.g.*, power spectra, second-order structure functions) of the scalar field are experimentally indistinguishable (in the inertial and dissipative ranges) for the two cases, we observe notable differences in the inertial-range scaling exponents (ζ_n) of the nth-order passive-scalar structure functions at higher orders ($n \geq 4$). The implication is that the variations in previous estimates of ζ_n observed in different experiments may be i) attributable to differences in the scalar field initial conditions, and therefore ii) inconsistent with a universal nature of the small-scale statistics of a passive-scalar field.

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[2]Warhaft and Lumley, 1978, *J. Fluid Mech.*, **88**, 659-684.

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