Abstract Submitted
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An infinity of microscales for turbulence[1] WILLIAM K. GEORGE, Imperial College of London — It is has long been accepted that the Kolmogorov microscale $\eta = (\nu^3/\varepsilon)^{1/4}$ is the smallest dynamically significant length scale of turbulence (e.g.,[1]), where ν is the kinematic viscosity and ε is the dissipation. Following George [2] it is argued that there are an infinity of smaller scales, say $\eta_n = (\nu^{n+3}/\varepsilon_n)^{1/(2n+4)}$ where ε_1 is the dissipation of the dissipation, ε_2 is the dissipation of the dissipation of the dissipation, etc. Each of these is equal to a spectral moment in homogeneous turbulence, $(2\nu)^{n+1}\int_0^\infty k^{2n+2}E(k)dk$. Time scales can be similarly defined. It is demonstrated how these play an important role, especially in non-stationary turbulence where Kolmogorov's equilibrium hypothesis is invalid.

[1] Tennekes and Lumley (1972) A First Course in Turbulence, MIT Press.
[2] George, W.K (2012) Asymp. Effect of Initial and Upstream Conditions on Turbulence, J. Fluids Engr, 134, 1061203-1–27.

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