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**The turbulence dissipation constant is not universal because of its universal dependence on large-scale flow topography** JOHN CHRISTOS VASSILICOS, NICOLAS MAZELLIER, Imperial College London — The dimensionless dissipation rate constant $C_\epsilon$ of homogeneous isotropic turbulence is such that $C_\epsilon = f(\log Re_\lambda){C'}_s^3$ where $f(\log Re_\lambda)$ is a dimensionless function of $\log Re_\lambda$ which tends to 0.26 (by extrapolation) in the limit where $\log Re_\lambda \gg 1$ (as opposed to just $Re_\lambda \gg 1$) if the assumption is made that a finite such limit exists. The dimensionless number $C'_s$ reflects the number of large-scale eddies and is therefore non-universal. The non-universal asymptotic values of $C_\epsilon$ stem, therefore, from its universal dependence on $C'_s$. The Reynolds number dependence of $C_\epsilon$ at values of $\log Re_\lambda$ close to and not much larger than 1 is primarily governed by the slow growth (with Reynolds number) of the range of viscous scales of the turbulence. An eventual Reynolds number independence of $C_\epsilon$ can be achieved, in principle, by an eventual balance between this slow growth and the increasing non-gaussianity of the small-scales. The turbulence is characterised by five length-scales in the following order of increasing magnitude: the Kolmogorov microscale $\eta$, the inner cutoff scale $\eta_* \approx \eta(7.8 + 9.1 \log Re_\lambda)$, the Taylor microscale $\lambda \sim {Re_\lambda}^{1/2}\eta$, the voids length-scale $\lambda_v \sim {Re_\lambda}^{1/3}\lambda$ and the integral length scale $L \sim {Re_\lambda}^{2/3}\lambda_v$.

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