

My list of jobs to do from 17 November 2009.

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Vacation post No 2. I will be out of the virtual office until Monday 31 August.

Recently I was tidying up some papers and I came across this list from 2009. At that time I had just entered my fourth year of retirement (now in my fourteenth!) and these were the things I wanted to do. Actually other jobs took priority and none of the following list was ever done!

1. LET: evaluate the Kolmogorov pre-factor as a function of Reynolds number. Does it asymptote?
2. DNS: 'Kolmogorov exponent' as a function of Reynolds number. (In fact the inverted commas were because this was shorthand for measure the power-law exponent for the inertial range of wavenumbers and see if it asymptotes to $-5/3$. I would also add the pre-factor to this, as in the LET case above.)
3. Calculate LET with the de facto vertex renormalization of omitting modes from the convolution sum: test for universality of the cut-off wavenumber ratios. (Method due to Kadomtsev: see Leslie's book.)
4. Do the same with DNS.
5. Make a systematic examination of the dependence on initial conditions for both DNS and LET.
6. Use DNS to investigate the vorticity transfer corresponding to the filtered, partitioned energy transfers T^{-} , T^{-+} , T^{+-} , and T^{++} .
7. Use stirring forces which are not 'white noise' to test effect of initial conditions.

Some of these ideas were prompted by the fact that I was studying the variation of the dimensionless dissipation as a function of Reynolds numbers at the time. This only required quite small Reynolds numbers and it was easy to map out the

dependence. Our first paper reporting this work was rejected by one of the referees because he had a simulation which could go to much bigger Re , and so our work couldn't be any good. Fortunately this idiosyncratic view did not prevail.

Seriously, though, I think that the turbulence community as a whole has been influenced by the need to get to large Re in order to resolve questions about universal behaviour, and it is perhaps time to build up a better understanding of the basic physics of turbulence by looking at the low- Re behaviour. Point 6 is relevant to large-eddy simulation, renormalization group and the scale-invariance paradox.

Are there any bright young people out there with access to a code and a computer who would like to take on any of these things? If so, just get in touch and I'll be happy to advise you.