

# Back to blog!

When I made my (rather optimistic) post this time last year, I didn't realise that my cataracts were accelerating, with a corresponding decline in my sight which slowed me down considerably. However, in the autumn I had surgery, with the result that I could see very clearly (at least in the literal sense), and I was able to start catching up with a new deadline for my current book [1] this September. I have just finished Chapter Nine on the *dimensionless dissipation*, and with only two chapters still to go I seem to be on track.

The dimensionless dissipation is an important topic in isotropic turbulence but seems to embody many of the confusions which are so characteristic of turbulence research. In particular, one idea due to Onsager in 1949 (and since then apparently studied in isolation from the history and scholarship of the subject) is that the behaviour of the dissipation is somehow anomalous. Indeed, the characteristic asymptotic behaviour of the dimensionless dissipation is now often referred to as "the dissipation anomaly".

Onsager had noted that an expression given by Taylor in 1935 for the dissipation rate 'did not depend on the viscosity' and that it 'had been derived by a form of dimensional analysis'. In the first case, he had been misled by Taylor. As I have now discovered, in a later publication Taylor had explained that the expression was not for the dissipation but for the inertial transfer rate. In this later work, he drew a distinction between these two rates, and in the process showed that he was *not* using dimensional analysis, but rather what some have called "the lumped parameter method". Dryden (in 1943), and others, built on this and further elucidated Taylor's work. Onsager seems to have been unaware of all this later work.

To be honest, like everyone else working in the field, I accepted the position as stated by Onsager. However, for my present book, I thought it necessary to dig deeper in order to

understand the context in which Taylor was operating. In the process, I found that I now regard some of my own terminology as incorrect. If time permits, I intend to post on various specific aspects of this over the next few weeks.

[1] Energy transfer and dissipation in isotropic turbulence: a unified, quantitative treatment of the energy cascade. Taylor & Francis: to be published.