Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

The decay of anistropic homogeneous turbulence WILLIAM K. GEORGE, MAJA WÄNSTRÖM, Chalmers University of Technology — One of the curious aspects of grid tunnel turbulence has been its non-return-to-isotropy; e.g., in [1] $\langle v^2\rangle/\langle u^2\rangle = 0.72$ and $\langle w^2\rangle/\langle u^2\rangle = 0.88$ throughout decay, while in [2] $\langle v^2\rangle/\langle u^2\rangle \approx 0.77$. We extend the equilibrium similarity analysis of [3] to the component spectral equations for anisotropic turbulence, and show the existence of permanently anisotropic solutions for which all components decay at the same rate. Moreover, the (physical) integral and Taylor microscales remain proportional during decay and the spectra and structure functions collapse using only Taylor variables. The theory is in excellent agreement with all of the available data, [2] and [3] in particular.

1. Antonia, R.A. *et al.* **JFM, 487**, 245-269, 2003.
2. Kang, H.S. *et al.* **JFM, 480**, 129,160, 2003.
3. George, W.K. **Phys Fluids A, 4**, 1493-1509, 1992.

Maja Wänström
Chalmers University of Technology

Date submitted: 30 Jul 2008 Electronic form version 1.4