

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Small-scale turbulent fluctuations beyond Taylor's frozen flow hypothesis¹ PINGER TONG, XIAOZHOU HE, Department of Physics, Hong Kong University of Science and Technology, GUOWEI HE, LNM, Institute of Mechanics, Chinese Academy of Sciences — The space-time cross-correlation function $C(r,t)$ of local temperature fluctuations in turbulent Rayleigh-Benard convection is obtained from simultaneous two-point time series measurements. The obtained $C(r,t)$ is found to have the scaling form $C(r,t) = C(R,0)$ with $R^2 = [(r-Ut)^2 + (Vt)^2]$, where U and V are two characteristic velocities associated with the mean and rms velocities of the flow. The experiment verifies the theory and demonstrates its applications to a class of turbulent flows in which the requirement of Taylor's frozen flow hypothesis is not met.

¹Work supported by RGC of Hong Kong SAR and China NSFC.

Pinger Tong
Department of Physics, Hong Kong University of Science and Technology

Date submitted: 23 Jun 2010

Electronic form version 1.4