

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Hairpin vortex trajectories in a turbulent boundary layer GERRIT ELSINGA, CHRISTIAN POELMA, JERRY WESTERWEEL, Delft University of Technology, ANDREAS SCHROEDER, REINHARD GEISLER, DLR Goettingen, FULVIO SCARANO, Delft University of Technology — Hairpin vortices within a turbulent boundary layer have been tracked in space and time resulting in their average trajectory and spreading rates with respect to the average. This information is used to predict the space-time correlation function of different flow variables, such as the individual velocity components and the invariants of the velocity gradient tensor, given their respective spatial auto-correlation functions. The predictions are in good agreement with the actual space-time correlations over convection distances up to one boundary layer thickness, which indicates that the decreasing peak correlation values over time reflect the spreading rate rather than an actual topological evolution of the individual flow structures. The results will also be discussed in relation to Taylor's hypothesis.

Gerrit Elsinga
University of Melbourne

Date submitted: 07 Aug 2009

Electronic form version 1.4