Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Stability of a wind turbine wake subject to root vortex perturbations[1] DAVID SMITH, HUGH BLACKBURN, JOHN SHERIDAN, Monash University — Results for DNS of a wind turbine wake will be presented. The Tjæborg wind turbine geometry is modelled using a spectral element solver in coupled to an actuator line model described by Sørensen and Shen (2002). The actuator line model considers the flow over the turbine by calculating body forces derived from two-dimensional airfoil data and flow velocity localised at the blade. Using such a model, Ivanell et al. (2010) identified instabilities in the tip vortex for sinusoidal perturbations that reduced the streamwise spacing between tip vortices. In work to be presented we consider perturbations to the blade-root vortex of the turbine. We examine whether perturbations to the root vortex can excite instability mechanisms in the tip vortex and potentially modify tip vortex downstream extents. We also explore how changes to the spacing between root and tip vortices modifies these effects. Ivanell et al. (2010) *J Wind Energy* **13**, Sørensen and Shen. (2002) *J Fluids Eng* **124**.

[1]Supported by Australian Research Council grant DP1096444.

Hugh Blackburn
Monash University

Date submitted: 02 Aug 2013 Electronic form version 1.4