Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Visualizing the effects due to a wind turbine in a stratified turbulent boundary layer NICHOLAS HAMILTON, RAUL BAYOAN CAL, Portland State University — As sustainable technologies and energy generation become more prolific, the need for larger wind farms becomes highly evident. It has been hypothesized that the behavior of heat and moisture transfer between the air and the ground is altered in the wakes of wind turbines. An experimental study at the Complex Boundary-layer and Wind Energy Based (CoBWEB) wind tunnel in Portland State University is performed to visualize the effects of these rotating structures under stratified conditions, thus modeling environments observed by a wind turbine array. A Schlieren technique is applied to study the interaction between the turbulent thermal boundary layer and the wind turbine. The Schlieren system employed here captures the temperature differences between the heat supplied through the floor of the wind tunnel and the air stream to image focal planes in upstream and downstream positions of a wind turbine. The data collected from this study demonstrates observable differences and effects due to the presence of the wind turbine.

Raul Bayoan Cal
Portland State University

Date submitted: 10 Aug 2010 Electronic form version 1.4