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Anisotropy stress invariants of a large eddy simulation during a diurnal cycle for very large wind farms RAL CAL, NASEEM ALI, NICHOLAS HAMILTON, Portland State University, GERARD CORTINA, MARC CALAF, University of Utah — Reynolds stress invariants of the turbulent flow within large wind farms under different atmospheric flow stratification (stable, unstable and neutral); cases without turbines is also evaluated. Lumley triangle and barycentric map are used to quantify the anisotropic stress tensor within the wind farm and atmospheric boundary layer. Dependent on the thermal stratification, the unstable and neutral cases of the wind farm and no wind farm display the minimum second invariant in contrast to the stable case that shows the maximum invariants. Scaled color is used to present the invariant as a function of domain height. The unstable stratification approaches the isotropy limit at high layers of the domain and the stable stratification leads the turbulence flow to be one component flow. The principle eigenvalues are also shown, where they show its effects on the vicinity of the swept area of the rotor. Finally, spheroid visualization is pursued to understand and interpret the realizable turbulence flow within the wind farm and atmospheric boundary layer.

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