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**Outer layer effects in wind-farm boundary layers: Coriolis forces and boundary layer height**[1] DRIES ALLAERTS, JOHAN MEYERS, KU Leuven — In LES studies of wind-farm boundary layers, scale separation between the inner and outer region of the atmospheric boundary layer (ABL) is frequently assumed, i.e., wind turbines are presumed to fall within the inner layer and are not affected by outer layer effects. However, modern wind turbine and wind farm design tends towards larger rotor diameters and farm sizes, which means that outer layer effects will become more important. In a prior study, it was already shown for fully-developed wind farms that the ABL height influences the power performance [1]. In this study, we use the in-house LES code SP-Wind to investigate the importance of outer layer effects on wind-farm boundary layers. In a suite of LES cases, the ABL height is varied by imposing a capping inversion with varying inversion strengths. Results indicate the growth of an internal boundary layer (IBL), which is limited in cases with low inversion layers. We further find that flow deceleration combined with Coriolis effects causes a change in wind direction throughout the farm. This effect increases with decreasing boundary layer height, and can result in considerable turbine wake deflection near the end of the farm.

[1] Allaerts D. and Meyers J., Phys. Fluids, 27, 065108 (2015)

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