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**Impact of tower modeling on wind turbine wakes** ELEKTRA KLEUSBERG, PHILIPP SCHLATTER, DAN HENNINGSON, KTH Mechanics, Stockholm — Recent research suggests the importance of modeling the support structure (tower and nacelle) when investigating the wake development behind wind turbines. These investigations are however mostly limited to low ambient turbulence levels which seldomly occur in field conditions. We present numerical simulations of wind turbine wakes using the actuator line method under different inflow conditions including varying turbulence levels and sheared inflow. The wind turbine, which employs the NREL S826 airfoil, is modeled after experiments conducted at the Norwegian University of Science and Technology. The rotor is investigated when perpendicular to the inflow and at a yaw angle of 30 degrees. The support structure is modeled using lift and drag body forces based on tabulated data. The simulations are performed with the spectral-element code Nek5000. After discussing the setup of the numerical domain and the turbulent inflow boundary condition, the influence of the tower model is characterized under turbulent, sheared and uniform inflow and the impact on downstream turbines is evaluated.

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