

## **Enhanced Actuator Line Simulation of a Wind Turbine by including the Conservative Load at the Blade Tip**

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At the tip of wind turbine blades, the radial bound circulation is transformed into chordwise circulation just before being released as trailing vorticity, giving rise to the tip vortex. The force acting on the chordwise circulation contains a radial and a normal component with respect to the blade axis. This load does not contribute to the torque, so it is a conservative load. As such, it is disregarded in the engineering tools used for the design of wind turbines. However, as we demonstrated in a previous work, the conservative load might influence the trajectory of the tip vortex. In order to see how this affects the blade loads, in this research we perform large eddy simulations with an actuator line model where the conservative load has been included. The conservative load reduces the angle of attack in the tip region as a consequence of the modified tip vortex trajectory, what has a negative influence on the lift and the power output. We conclude that the accuracy of engineering design tools of wind turbines can be improved if the conservative load acting at the tip is considered.