Effects of finite aspect ratio on wind turbine airfoil measurements

Wind turbines partly operate in stalled conditions within their operational cycle. To simulate these conditions, it is also necessary to obtain 2-D airfoil data in terms of lift and drag coefficients at high angles of attack. Such data has been obtained previously, but often at low aspect ratios and only barely past the stall point, where strong wall boundary layer influence is expected. In this study, the influence of the wall boundary layer on 2D airfoil data, especially in the post stall domain, is investigated. Here, a wind turbine airfoil is tested at different angles of attack and with two aspect ratios of AR = 1 and AR = 2. The tests are conducted in a wind tunnel that is pressurized up to 150 bar in order to achieve a constant Reynolds number of Rec = 3 \cdot 10^6, despite the variable chord length.

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