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Turbulent Potential Model Predictions of High Re Flow Around the S809 Airfoil NATHANIEL DEVELDER, Univ of Mass - Amherst — Utility scale wind turbines operate at a range of chord-based Reynolds numbers often between 10^6 and 10^7. Reynolds Averaged Navier-Stokes (RANS) models offer computational efficiency at high Reynolds numbers. As a model that avoids the eddy-viscosity hypothesis, the Turbulent Potential Model, a time-varying RANS model, is identified as an appropriate balance between computational resource usage and physical fidelity. Development of the Turbulent Potential Model is discussed. Comparisons are made between Turbulent Potential Model results and Moser's Direct Numerical Simulation Re_τ=590 channel flow. S809 airfoil simulations at $\alpha = 0.02°$, $\alpha = 4.03°$, $\alpha = 10.03°$, and $\alpha = 20.11°$ are compared to results from the $k - \omega SST$, Spalart-Allmaras, and $v^2 - f$ models, as well as wind tunnel results from Ohio State University.

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