<u>Response to referee comments</u>

General:

The purpose of the present paper is the publication of a database for publicly available state of the art airfoils containing the relevant aerodynamic **AND** aeroacoustic information for the design of a wind turbine blade. This database enables the reader to choose adequate airfoils during the design process for an aerodynamically and aeroacoustically optimal rotor. To the author's knowledge such a database currently does not exist publicly available. **Furthermore** the chosen approach is described in detail, the aerodynamic methods are validated against experimental data and therefore critically analyzed. As the first author states in the paper, an engineering approach is selected for the computation of the aerodynamic coefficients rather than the highest available fidelity approach. The reason for this is the trade-off between accuracy and efficiency. For achieving more accurate aerodynamic coefficients a more sophisticated 3D approach is necessary, but this results in computational times which are at least 1-2 orders of magnitude higher. On the contrary, the results presented in the paper are much more accurate than what can be achieved with empirical functions as described in Skrzypiński et al. Moreover the proposed method is free of empiricism.

The answers to the referee's responses are as follows (ordered from top to bottom):

1. If one applies Buckingham's π-theorem, it can be deduced that the Reynolds number is the critical characteristic number for this problem. As now stated in the paper more clearly the final goal of generating the polar tables is the design of a wind turbine blade including further improvements again based on the polar tables. The rotor to be designed will have a radius of 20m. Choosing a typical rotational speed (such that the tip speed will be around 80 m/s), a preliminary design including the chord length distribution along the radius can be approximated. From this an approximate Reynolds number distribution along the radius can be approximated. This Reynolds number will be in the order of $1*10^6$. For a pure aerodynamic analysis the freestream velocity can be chosen almost arbitrarily. For technical reasons (small velocities in a compressible solver will result in a stiff system of equations) a very small inflow velocity is not recommendable. Also choosing the tip velocity (or even above) as the inflow velocity is not recommendable since Mach number effects will start to become relevant. Therefore the intermediate velocity of 40 m/s has been chosen as a representative inflow speed. Inflow speeds of 30 m/s or 50 m/s would give the same results.
2. The main reason for choosing this turbulent intensity is not the atmospheric turbulence but the comparison with the experimental data.
3. If all operational conditions according to IEC regulations should be considered it is necessary to be able to provide the aerodynamic coefficients of the airfoils integrated in the wind turbine blade for angles of attack from 0° to 360°.
4. The authors are aware of the convergence problem and have therefore analyzed the results closely according to the convergence measures (density residual, Cl-amplitude). Non-converged solutions are excluded from the final polar or their impact is smoothed according to the

regressive interpolation. The improved polars (improved means better results than based on empirical functions) are subsequently used in a comprehensive rotor code based on the BET for analyzing the various operational conditions.

5. The referee comment "The authors validated their three numerical methods based on a single incomplete data set" is unclear to the authors. The experimental data set which is used for comparison is one of the most complete publicly available data sets. The method how the data sets are combined is described in section 2.5. The general procedure is referenced to further publications and is a valid procedure as can be seen in case the referenced publications are studied closely. The fact that neither numerical approach was superior to the others for **ALL** angles of attack is the reason why the (intelligently) combined dataset is superior to the single datasets.
6. See general comment
7. Has been adjusted according to comments from first referee