

Interactive comment on “Multi-element ducts for ducted wind turbines: A numerical study” by Vinit V. Dighe et al.

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Thank you for your valuable comments, appreciate it. The following are the responses to your comments:

1. The Reynolds number (based on the duct nozzle diameter) covered in Igra’s experiments (late 1970’s) ranged between $5 \times 10^4 < Re < 3 \times 10^5$. For the numerical study (as for panel and RANS iterations), $Re \approx 3.5 \times 10^5$; the value is based on the geometry currently being tested in the wind tunnel experiments.
2. The augmentation factor (for Model B) denoted by r in the paper increases with the increase in yaw angle α ; this is rightly interpreted by you. The augmentation factor r for different values of α depends on the shape of the duct and the mutual interaction

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of the duct and the rotor. The preliminary results highlight the advantage of DWT configuration in urban flows, where the presence of infrastructure/buildings disturbs the flow uniformity resulting in reduced wind speed. A detailed study on characterization of the aerodynamic performance for DWT in yawed flow was beyond the scope of the current article; this is one of the ongoing work and will be published soon. Comparing the experimental data (Model B) with the numerical results (Figure 5) shows a good validation for augmentation factor r ; deviation $\leq 4\%$. The deviation might be due to three-dimensional effects not accounted in the two dimensional simulations.

3. The numerical study exhibit an optimal configuration for the given geometrical parameters (shape and orientation) of the multi-element duct-AD model. The local maximum, however, will be different for different multi-element geometry and the choice of AD (rotor) loading. The near-optimal region is well captured by both the numerical methods. The panel code (single and multi-element duct configuration) is freely available on contacting the authors.

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