

Review Report: “Implementation of a Simple Actuator Disc for Large Eddy Simulation (SADLES-V1.0) in the Weather Research and Forecasting Model (V4.3.1) for Wind Turbine Wake Simulation”

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Summary

The paper titled “Implementation of a Simple Actuator Disc for Large Eddy Simulation (SADLES-V1.0) in the Weather Research and Forecasting Model (V4.3.1) for Wind Turbine Wake Simulation” introduces SADLES as a wind turbine model in WRF. The study aims for realistic downscaling of large eddy simulation and focuses on wind farm assessment. The major concerns revolve around the perceived lack of novelty, absence of radiation considerations, brevity in the discussion, and reliance on instantaneous flow analysis. Minor issues include duplicated text portions and unclear figure captions.

Major Issues

- **Novelty Clarification.** The paper should provide a clearer description of its novelty, particularly in the implementation of the actuator model in WRF-LES. Highlighting the unique aspects of this implementation would strengthen the paper’s contribution.
- **Radiation Consideration.** The absence of radiation in the study, a crucial component in models like PALM, should be discussed as a limitation. It’s recommended to reference relevant radiation-related papers (<https://doi.org/10.5194/gmd-15-145-2022> and <https://doi.org/10.5194/gmd-14-3095-2021>) to support this point.
- **Discussion Depth.** The discussion section is noted to be brief and superficial. Expanding this section to delve deeper into the implications and significance of the results would enhance the overall quality of the paper.
- **Instantaneous Flow Analysis.** Authors are advised not to rely solely on instantaneous flow-related analysis, emphasizing that in LES, such instantaneous flows may lack meaningful interpretation. Discussing the limitations and considerations regarding the choice of analyses would strengthen the paper.
- **Choice of Comparative Model.** The paper compares results with PALM, a numerical model. Authors should discuss the rationale for this choice and why they did not consider comparing results to experimental data or field measurements to enhance scientific validity.

Minor Issues

- **Text Repetition.** Duplicate copy-pasted portions in the manuscript (lines 59-65/66-72 and 256-259/260-264) should be addressed to ensure the clarity and flow of the manuscript.

- **Figure Captions.** The clarity of figure captions should be improved to enhance reader understanding. Clear, concise, and informative captions are essential for effective communication.