

Review of the paper “Impact of a Two-Dimensional Steep Hill on Wind Turbine Noise Propagation”.

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Recommendation: Minor revision.

Summary:

The paper explores the complex dynamics of wind turbine noise propagation in hilly terrains using advanced numerical simulations. By solving the linearized Euler equations in a moving frame that follows the wavefront, and employing LES to simulate turbulent flow around the hill and wind turbine, the study provides a comprehensive analysis of how terrain topography affects sound pressure levels downwind. The topic is of significant interest, the methodology is robust, and the findings contribute substantially to our understanding of terrain - turbine noisy propagation dynamics. However, several issues must be addressed before the manuscript can be recommended for publication. My comments are categorized as either 'Major concerns' or 'Minor concerns', with the former focusing on conceptual technical critiques, and the latter highlighting grammatical and spelling errors.

Major concerns:

- **(1):** In section 2.2, it mentions that Propagation model is solved in a 2D domain i.e., $v = (u, w)$. The LES solver provides 3D velocity components, including the component (v). However, the propagation model operates in a 2D domain, which might not directly account for this additional dimension. Clarification on how the extra velocity component is integrated or approximated in the 2D propagation model is needed.
- **(2):** In Figs 15-18, the values near the turbine are not available, please explain why this happens? and how do the authors pick this range of this?

Minor concerns:

- **(1):** In page 5, the manuscript mentions that ” For each configuration, LES are performed for a truly neutral ABL, with and without the turbine inside the flow”, please clearly define what’s truly neutral ABL.

References