Review of the manuscript wes-2014-138 entitled "Investigating the Relationship between Simulation Parameters and Flow Variables in Simulating Atmospheric Gravity Waves for Wind Energy Applications" by M. A. Khan, D. Allaerts, S. J. Watson, M. J. Churchfield

Overview

This study addresses the problem of damping the atmospheric gravity waves (AGW) spuriously reflecting from the boundaries of a numerically simulated domain depending on the provided boundary conditions. Great attention is devoted to the choice of the numerical simulation setup (i.e. domain length and height) in relation to the main non-dimensional parameter governing the problem (i.e. Froude number and aspect ratio of the obstacle triggering the waves). The results, arising both from the simulation of the flow around a hill and a wind farm, indicate that, for low Froude numbers (typical of wind farms operating in a stably stratified flow), the horizontal and vertical AGW represent the best way to effectively scale the simulation domain to minimize the reflection of gravity waves. Furthermore, when a Rayleigh damping layer is used, the optimal damping coefficient scales with the Brunt-Vaisala frequency.

The article is well written and addresses an important topic for the wind energy community. Thus, I recommend its publication on WES after some minor corrections I reported below.

General comments

- **Line 207**: For the sake of clarity, I would write the steady-state, semi-analytical solution explicitly.
- **Line 215**: Is there a more rigorous way to define the dominant wavelength than the most apparent in flow visualizations?
- **Lines 229-230**: From Fig. 2, it seems like the energy associated to λ_{hor} is not constant as the streamwise coordinate increases. Does this quantity depend on the length of the streamwise domain itself?
- **Line 232**: As per the steady-state solution, I would write the explicit form of the amplitude as a function of the wavenumber. This would help understanding the following points the authors made.
- **Line 241**: By mentioning the vertical wavelength, do you imply to take the FFT along the vertical direction? The z-coordinate is not homogeneous (due to the Dirichlet condition typically imposed at $z = 0$), so this operation cannot be done without further clarifications.
- **Line 299**: For the wind farm case, did you provide a velocity profile at the outlet, or did you implement a Neumann boundary condition?
- **Line 337-338**: The definition of upward and downward moving waves is unclear. The quadrant definition depends on how you define positive and negative wave number coordinates, which is unclear as of now. Please further clarify this aspect or add a figure to better explain it.

- **Lines 483-486**: Besides the effects of domain length and height, I would also mention the AGW's angle among the factors determining the reflection coefficient, at least reporting the interval of observed AGW angles.

Technical corrections

- **Line 102**: When you mention the "sponge zones", please put the comma outside of the quotes.
- **Figure 3b**: The representation of the main wavenumbers of interest is a bit confusing when all of them are reported with the same color. Besides using different line styles, I recommend using different colors as well.
- **Line 236**: Please replace "then" with "than".
- **Line 283**: I would put a comma between "*Fr*" and "because" instead of a period.
- **Line 293**: Please remove either "used" or "solves" as they sound redundant.
- **Line 400**: Please replace "seem" with "seen".
- **Line 598**: Please replace "as will" with "as well as".