Interactive comment on õVerifications of the nonlinear numerical model and polarization relations of atmospheric acoustic-gravity wavesö by N. M. Gavrilov and S. P. Kshevetskii

Anonymous Referee #2

The paper is devoted to the comparisons of atmospheric wave parameters calculated using Direct Numerical Simulation (DNS) model with polarization relations (PR) given by analytical theory of linear acoustic-gravity waves (AGWs). Such comparisons can be used to test as the numerical models as the PR themselves. There are no such direct comparisons of analytical PRs with wave DNS models in the scientific literature. Therefore, the paper presents new and important results, which are to be useful for verifications of atmospheric wave DNS models and to improve the parameterizations of AGW effects in atmospheric dynamical models. The paper is within the scope of the GMD journal. The title and abstract reflect the contents of the paper. The overall presentation is clear and adequately structured. Therefore, the paper can be recommended for publication in the GMD after some minor revision.

Specific comments:

P7809, L7 "… of the continuity, momentum, and heat balance".

P7809, L20-21. "… laws of the momentum, mass, and energy".

P7809, L20-25. It would be helpful to extend the description of the numerical algorithm and give some explanations concerning the difference between the standard Lax and Wendroff scheme and suggested modifications.

P7810, L2. Please explain, why you need so small vertical grid spacing (12 m) near the ground.

P7810, L2. "… at altitudes of about 500 km…"

P7811, L6. "… sound speed,…"

P7811, two last equations (5). What denotes alpha?

P7812, equation (7). "… (UW*)/2, where "*" denotes the complex conjugate value.

P7812, L10. Reformulate the phrase in the middle "To make simulations matching to the linear AGW theory (see Eq.(2)), …")

P7813, L3. "very high altitudes".

P7814, First sentence. "These intervals grow …".

P7814, L5. "The Table contains simulated SDs at each altitude averaged over n model outputs during …"

P7815, L15. Why you did not compare DNS model and linear PR above 100 km? If such comparisons were made, it would be helpful to give respective description.

P7815, L13-15 and P7816, L9-13. There is a possibility of AGW reflection from the dissipative region in the thermosphere – see, for instance, Yanowitch, M. Vertical oscillations in a viscous and thermally conducting isothermal atmosphere. J. Fluid Mech., 1974, 66, 273-288. A short discussion will be useful.

P7815, Last para. "… momentum fluxes F_{mz} given by Eq. (7) and …"

P7821. Tables 1, 2. The authors used steady-state analytical PR for comparisons during transience time intervals. Why the authors suppose validity of the steady state PR in this case?

English in the manuscript needs improvements.