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Geoscientific Model Development Discussions

Interactive comment on "Quasi-hydrostatic equations for climate models and the study on linear instability" *by* Robert Nigmatulin and Xiulin Xu

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Dear Paul Pukite,

Thank you very much for your comments.

This paper is devoted to studying the stability property of the system of partial differential equations (with quasi-hydrostatic approximation). We use the linearized equations (not the original equations) to describe the shortwave perturbations. Such perturbations occur in simulations regardless of what numerical scheme is adopted, and grid sizes of meshing determine the (minimum) wavelengths of perturbations. As we do not

develop any numerical methods for solving the original equations, we lack a comparison of the calculation data with real data. But we find out how grid sizes affect the growth rate of small shortwave perturbations in general.

We note that the harmonics in the citation (Mathematical Geoenergy, Wiley/AGU (2018) https://agupubs.onlinelibrary.wiley.com/doi/10.1002/9781119434351.ch11) is different from that of in our paper.

In the citation above, the harmonic external forcing leads to a harmonics-form solution to the original equations. While in our paper, we assume a harmonics-like solution to the system of linearized equations with regards to perturbations.

Best regards,

Xiulin Xu

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