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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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Of course you are right about emulating some known physical behavior, and also a citation

> "all models are wrong, but some are useful"

at the principle page of `www.geoscientific-model-development.net` seems to be very appropriate. But the Authors do not want to validate their model agaist your example or any other, they want just to declare a Theorem without showing any proof.

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Discussion paper

At the same time, when a result is formulated as a theorem, it can only be either *true* or *wrong*. And a wrong theorem may result in denying the *useful* models and appearance of *useless* models. I suppose that this is the case with the Paper under consideration and also with the previous Paper of the first author https://doi.org/10.1134/S0015462818040201.

This is why I am asking the Authors to give a proof of the claim in their Theorem, that from the smallness of the vertical acceleration it follows, that equation for the change of the vertical momentum can be replaced by hydrostatic balance while assuming the finite vertical acceleration. To my knowledge, the correct asymptotics should be given by the $\varepsilon = H/L$, where H and L are the vertical and horizontal scales of motion. Strictly speaking, if the Theorem in the Paper was true, the Life on Earth would not appear. At least as we know it, since restoring force about 0.01 of gravity would be always "neglected", and no typical flows with convection, internal waves (except for long ones) etc. would arise in Ocean and Atmosphere.

And it is not just a philosophical question. The first Author is actually insisting on application of his theorem in Moscow University.

I still hope, that a result of this public discussion, the Authors will retract the Theorem in this Paper, and also the first author will retract the paper https://doi.org/10.1134/S0015462818040201 where the Theorem appeared for the first time. Or otherwise, the Authors will finally present a proof of the Theorem, so it can be publicly acknowledged as true or false.

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