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Geoscientific Model Development Discussions

Interactive comment on "The Parallelized Large-Eddy Simulation Model (PALM) version 4.0 for atmospheric and oceanic flows: model formulation, recent developments, and future perspectives" *by* B. Maronga et al.

Anonymous Referee #2

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In the manuscript The Parallelized Large-Eddy Simulation Model (PALM) version 4.0 for atmospheric and oceanic flows: model formulation, recent developments, and future perspectives" by B. Maronga et al. the authors present a comprehensive description of the latest version of the large-eddy simulation (LES) model PALM. PALM model is an open source model distributed unde GNU General Public License v3. It has been under development for 15 years and in the present form it represent an advanced framework for numerical simulations of atmospheric boundary layer flows. The model is well documented, including through an up to date web page. Nevertheless, the

manuscript represents a welcome addition to other resources as it provides extensive detail about all the model components including numerics, physics parameterization, and software implementation. It provides information for a potential user to get an insight in PALM's capabilities and a new use to effectively use it.

General Remarks

It would be useful to include at least one or two simple examples cases of LES with PALM, e.g., some of the typical canonical ABL cases. The examples could include description of the setup as well as some basic results (mean profiles of wind speed and potential temperatue), and perhaps a three-dimensional iso-surface level of some quantity. When implementation of the advection algorithm is discussed it is not necessary to include the actual code, but it would be sufficient to describe two different implementation of do loops.

Specific Remarks

Page 1540, line 15 – The statement "The idea of LES goes back to Smagorinsky (1963)" is not accurate. Smagorinsky (1963) discussed global circulation modeling and not simulations of fully developed, three-dimensional atmospheric boundary layer turbulence. Smagorinsky (1963) can be given credit for relating eddy viscosity to the magnitude of the local, horizontal rate of strain following previous work of von Neumann and Richtmyer on shock capturing numerical simulations (Smagorinsky, Large Eddy Simulation... Where Do We Stand?, International Workshop, December 19-21, 1990, St. Petersburg Beach Florida). Instead Lilly (1966, 1967; http://opensky.library.ucar.edu) and Deardorff can be credited by developing LES.

Page 1540, line 20 – Some references to review papers on LES of ABLs should be included (e.g. Mason 1994).

Page 1551, equations 31, 32, 33, etc. - Symbol Psi is usually used for the integral of the stability function which is usually denoted with Phi.

Page 1558, line 10 - Acronym "PSU" should be defined.

Page 1584, line 14 - Instead of "immense" at least an order of magnitude estimate should be given.

Page 1596, line 29 – Instead of “nonlinear” it should be “nonlinearly.”

Page 1597, line 1 – Instead of “nonlinear” it should be “nonlinearly.”

Page 1597, line 2 – Instead of “speed up” it should be either “sped up” or “speeded up.”

Page 1597, line 29 - Instead of “speed up” it should be either “sped up” or “speeded up.”

Page 1607, line 3 – I thought that it was mentioned at the beginning that the code is already “anelastic.”

Page 1609, line 16-24 – The discussion lacks depth and adds little value to the manuscript either it should be omitted or expanded.

Interactive comment on Geosci. Model Dev. Discuss., 8, 1539, 2015.