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Model Development
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comment

Interactive comment on "ConvectiveFoam1.0: development and benchmarking of a infinite-Pr number solver" by Sara Lenzi et al.

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Received and published: 3 July 2020

1. The innovative part of this work is strictly linked to the mathematical and the computational aspects of the problem.

The mathematical structure of the momentum equation changes its nature in the $Pr \to \infty$ limit (treated in Sec 3.1), and, indeed, different approaches are required to solve the two different kinds of second order partial differential equations. In the infinite Pr case, the momentum equation becomes a contraint (a diagnostic relationship).

Given this, the strength of this work consists in maintaining the original diagonal dominant structure of the OF solver, suited for the finite-Pr cases, to reproduce results in agreement with the $Pr = \infty$ case. This agreement is reached, once the convergence

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criteria are satisfied.

2. As mentioned, the infinite-Pr solver is still lacking in the OpenFOAM community and the code benchmarking can't disregard from steps in which a constant viscosity is assumed.

The opinion of the authors is that this fundamental step must be made available to the community, by virtue of the open source nature of the platform. Our opinion is that this work should be documented on GMD because we think it meets the scientific purpose of the journal: GMD "...is a not-for-profit international scientific journal dedicated to the publication and public discussion of the description, development, and evaluation of numerical models of the Earth system and its components...".

Finally, as noted by the referee, since from the geoscience point of view a temperature-dependent viscosity is the more interesting application at now, *"...the model is conceived to include future applications with non-Newtonian viscosities (dependent on temperature and pressure), multi-phase and multi-component flows..."* (as reported in the Introduction).

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2020-28, 2020.