

Interactive comment on “Particle Clustering and Subclustering as a Proxy for Mixing in Geophysical Flows” by Rishiraj Chakraborty et al.

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We thank the reviewer for their comments, and we have modified the manuscript based on the the reviewer’s suggestions. We provide detailed discussion in bold below the each of the reviewer’s comments and in the manuscript the changes are denoted in red.

Comments

1. In a paper based on simulations I would expect some critical discussion about the influence of the numerics on the results. In the manuscript this is missing,

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although in principle the topic of mixing cannot be treated without considering what happens near the resolution scales. I would ask the authors to add details about it, like for instance a resolution study or more in-depth considerations on the numerical tools that they are using, and how they can affect their results.

Response: A paragraph of discussion on numerics has been added to the text. The spectral method used is close to optimal, for a fixed grid, and along with the grid resolution tests we have carried out, this gives us considerable confidence in the code. The more challenging issue, going forward will be to consider 3D simulations.

2. Despite of the detailed theoretical description, most of the analysis of the results is based on a qualitative assessment of the figures. Would it be possible to define some quantitative diagnostics to support what the authors infer?

Response - A quantitative figure regarding the position of the dense clusters has been added to the manuscript. Moreover, theoretical description provided, is about the methods of community detection from a graph. We use this technique to draw inference about characteristics of mixing from a graph.

3. the style of citations should be improved. Not everything should go in brackets, i.e. sometimes
citet should be used instead of
citep (assuming the authors used LaTeX for editing).

Response - Appropriate changes have been made in the text.

4. p.8, eq. (4): 1) do I understand correctly that gamma is in the interval between 0 and 1? If it is the case, please mention in the text.

Response - It has been mentioned in the revised text.

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C3

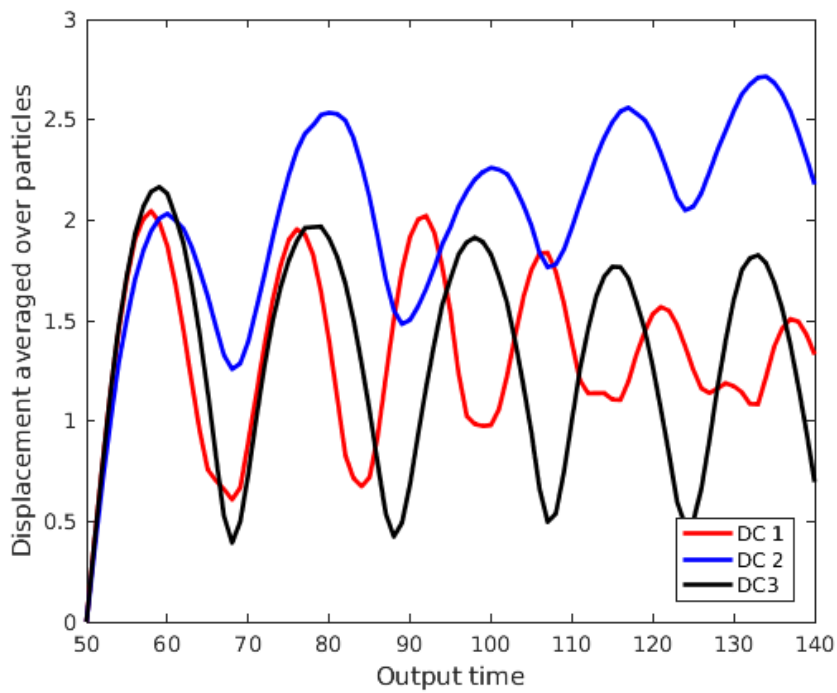


Fig. 1. Displacement averaged over particles in dense clusters from clusters 1,2,3 (DC 1,DC 2, DC 3) measured from positions at output time 50 vs output time.

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