‘On dissipation time scales …’ preprint, response to Anonymous Referee #1

Review by Anonymous Referee #1 (https://doi.org/10.5194/egusphere-2023-3164-RC1).

Authors' response in italics, highlighted by light grey colour.

The manuscript is well written, logically structured, and clearly present the novel results. I have only a few rather minor comments to the study and its presentation.

We would like to thank the reviewer for their interest in our paper and for the valuable comments.

Introduction in general. (1) Could you indicate clearly the research questions of your study; and (2) briefly present the structure of your manuscript?

The introduction has been rewritten to emphasise the main research problems of our study and outline the structure of the manuscript.

Lines 75-80. There is rather rough transition to DNS results, please rewrite the text.

This part of the paper has been rewritten and the transition to the DNS results has been added.

Line 89. Wind is a projection of velocity on the horizontal plain, there is no "wind velocity", please correct.

The notion “wind velocity” has been corrected and replaced by “mean flow velocity”.

Line 89. Why \Theta is bold, is it vector?

\Theta is scalar, this typo has been now corrected.

Section 3. Line 175. The paper would benefit from the Table with summary of all DNS experiments and their parameters.

It is also useful to have a Figure with the mean profiles of some DNS runs.

Table 1 summarising the DNS experiments parameters has been added as well as Figure 1 demonstrating Couette flow mean profiles.

Line 202. What is "a rational regression model"? What software was used to obtain the regression? This is non-linear regression, what is the method to fit the coefficients? What are confidence intervals for the coefficients?

We have added the reference and the details of fitting procedure summarised in Table 2.

Figure 3. There are much more gray dots than red dots, why? Does the scatter in the gray dots mean that thickness of the transitional sub-layer was different in different runs. It would be useful to have a look on a few DNS run results.

The thickness of the viscous sublayer does indeed vary, as it depends on prescribed viscosity (Re) and stratification (Ri): 0<z<50ν/τ^(1/2). In this study, we deliberately chose to shade the viscous sublayer in DNS results, focusing on the fully developed turbulence because the EFB closure was designed for the fully developed turbulence rather than the viscous sublayer. The thickness of the viscous sublayer for each experiment has been added to Table 1.

Figure 4,5,6. What are statistical significance of the presented regressions. Scatter is rather large there, what is R-square (explained part) for these approximations?

The statistical significance of all approximations has been added to the figures. We have added Table 2 indicating the R-square and RMSE of the approximations.

Conclusions. It would be helpful to have a brief summary of the obtained closure with all values of coefficients summarized in a Table.

The brief summary of the closure has been added to Table 2.

Code and Data. It is reasonable to make available all data used to plot the figures as well as the mean characteristics of DNS runs and mean profiles through a data sharing facility, e.g., ZENODO or similar.

All data used in the manuscript together with meta-data of DNS runs will be uploaded to b2share.eudat.eu. Please check the revised manuscript for the permanent link.