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Interactive comment on "Resolution dependence of magnetosheath waves in global hybrid-Vlasov simulations" *by* Maxime Dubart et al.

Anonymous Referee #2

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The authors applied three 2-D global hybrid-Vlasov simulations to investigate the dependence of ion cyclotron and mirror mode instability on the spatial resolution. By comparing three runs, the authors conclude that $\Delta r \sim 0.6$ di is an acceptable minimum spatial resolution for a simulation to study magnetosheath waves. The importance of this work is to help future simulations to save resources. However, I have some concerns about the conclusion.

Major comments: Plasma β is one very important parameter to two instabilities. If different solar wind speed, solar wind temperature, and IMF field strength are used in the simulation, the plasma β in the magnetosheath will be very different. So my concern is that the concluded spatial resolution very likely depends on the magnetosheath plasma β or solar wind parameters. Therefore, it is necessary to justify that the conclusion is

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true for all the possible solar wind parameters or how the conclusion depends on the solar wind parameters. Otherwise, the importance of this work to future simulations will be very limited.

Under this certain solar wind condition, the authors conclude that $\Delta r \sim 440$ km = 0.6 di would be adequate. However, I am not convinced by this number which is based on the growth rate profile. For example, where the growth rate is calculated may not be the source region. So I wonder whether the authors can run several more cases, e.g., with Δr around 400 km, to show that the results are indeed close enough to the case with Δr=300 km.

Minor comments: Please rephrase “magnetosheath waves” in the abstract and conclusion as there are not just mirror mode and AIC waves in the magnetosheath.

Why the position of quasi-perpendicular bow shock in Figure 1c is more outward than Figures 1a and 1b?

In Figure 2f, there are signals along two blue lines. What are they?

In Figure 5, it would be better if there are similar panels of other two runs for comparison.

There are some typos such as line 221, “were the data were taken” -> “where the data were taken” and line 225, “more efficient tp” -> “more efficient to”.

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