Atmospheric
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Discussions

Interactive comment on "Development of a new Nano-particle sizer equipped with a 12 channel multi-port differential mobility analyzer and multi-condensation particle counters" by H. K. Lee et al.

Anonymous Referee #2

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This manuscript presents a design of a novel differential mobility analyzer with multiple outlets enabling fast parallel measurement of particle size. The manuscript is written mostly in a clear and concise manner presenting the main details of the design of the instrument and tests done to verify its operation. However, some parts of the manuscript explaining the experiments need clarification (see questions below). This manuscript is fit for publications once the questions and comments below have been addressed.

1. P. (Page) 4, L. (Line) 87: Suggest changing wording to help the reader to understand the difference between "aerosol flow rate" and "sampling flow rate". Perhaps "sampling flow rate *for each CPC*".

2. P. 4, L. 95: As each CPC samples through a single port, how uniform are the sample flows across the circumference of each annulus? One would expect needing multiple ports per annulus to ensure uniformity of flows. Was any CFD modelling done to study the internal flows? Please discuss it.

3. P. 4, M-CPC: are there any publications about the M-CPC which could be referenced in this manuscript? If not, then more information about the design and working parameters of the M-CPC should be provided here.

4. P. 8, L. 210 and below, also start of P. 9: This paragraph needs elaboration with more explanation provided on how the experiment and data analysis was done. For example, what is meant by "central particle diameter"? How were penetration ratios obtained? Was the TSI SMPS size classification point changed or kept constant? What were the parameters of the aerosol size distribution coming from the SMPS? Was the SMPS data corrected in any way (multiple charging, diffusion losses etc.)? Please add more details.

5. Figure 2: Is the SMPS in 2(c) the same as "standard DMA" on 2(a) and 2(b)? If so, state it clearly.

6. Figure 3: Is the bias at higher concentrations taken into account in data inversion?

7. P. 9, L. 248 and Figure 8: There's a 5500 cm^{-3} bias between the total number concentration measurements from the two instruments, with NPS measuring lower than SMPS. Where does this difference originate from? Is this corrected in data analysis/inversion? Does this mean that the NPS can't measure total particle number concentrations less than 5500 cm^{-3}? That's a fairly high number for many atmospheric applications. Please discuss.

8. Figures 7, 8, 9: Were any corrections applied to the SMPS data (multiple charging, diffusion losses etc.)? State this clearly to help the reader make accurate assessments of the results.

9. Figure 9: What is meant by first and second scanning data in the figure caption? If these are SMPS scans taken during the measurement, then indicate when they were taken on the NPS color plot. Also, please label the individual plots clearly to indicate from which instrument they are from.

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