General Comments

Review of the paper " AerSett v1.0: A simple and straightforward model for the settling speed of big spherical atmospheric aerosol. " by Mailler et al.

In this manuscript the authors derive a mathematical expression for the calculation of the settling velocity of spherical atmospheric aerosols up to diameter of 1mm. They showed that the derived direct formula gives results within 2% of the exact solution obtained by numerical methods, and can be used in global transport models to improve their computational speed.

The paper is well motivated, and in principle logically well organized. There are some parts that need to be expanded and rewritten, such as the Introduction and the Conclusion sections (please see my comments below). The abstract summarizes the presented results, the bibliography corresponds to the good quality of the paper (although it needs to be enriched). The figures are with good quality of precise description and illustrate well the quality of the paper and bring the necessary information.

I suggest the publication of this work after some clarifications and additions are made.

Specific comments

- Section 1.
    - Introduction section needs to be better organized and rewritten. It does not place the study in a broader scientific context, and it does not highlight the significance of this work.

    - Line 10: The authors state that the goal of this article is the study of the terminal velocity of spherical aerosol particles. Why? Why do we care? Why is this important?

    - Line 16: References are missing. Moreover, definitions of "small dust particles" and "giant dust particles" are missing.

    - Lines 18-21. This sentence does not make sense. The authors list some reasons (without proper reference and a small description) that contribute to an underestimation. Underestimation of what? More over they mention a recent focus on giant particles without providing some references to show this focus. Finally, they state that this focus on giant particles highlights the need of a robust and efficient way of calculating the settling speed of large particles. This is not quite accurate. As Adebiyi and Kok (2020) show, the large particles are not represented at all in global models. This means that the top priority is the need to include the effects of these particles to the models, with the calculation of their terminal velocity being just one of the aspects that need to be addressed. Of course a robust and efficient way of this calculation is needed, but right now there is no way at all.

- Lines 25-28. The authors discuss the work by Drakaki et al. (2022). They say that in the referenced work the drag coefficient by Clift and Gauvin (1971) has been used by a bisection method. Then they say that Drakaki et al. (2022) highlight the importance of including large particles (for what?), and then they say again that the Clift and Gauvin (1971) drag coefficient has been used. These lines need to be rewritten.

- Lines 28-31. In the previous lines the authors state that Drakaki et al. (2022) showed the importance of including large particles, but here they state that Drakaki et al. (2022) remark that much better agreement between model and observations is reached when, apart for applying the Clift and Gauvin (1971) drag correction factor, the settling speed of dust particles is reduced by an empirical factor of 80% . 80% is a large artificial reduction. So, how important is the change of the drag coefficient? I find the way that the work by Drakaki et al. (2022) is presented by the authors to be confusing and not accurate.

- Section 2.
  - Lines 41-42. Mallios et al. (2020) as well as Drakaki et al. (2022) include the slip correction factor in the drag equation, because it is crucial for particles with Reynolds numbers less than 1. Why do the authors have omitted this factor?

  - Line 61. van Boxel (1998) (the reference is not correctly presented in this line) does not describe the iterative method. They just mention that an iterative method has been used to solve the non linear equations. So, what iterative method can be used to solve Equation 1 (and not 2 as mentioned in the text)?

  - Lines 62-63. What deviation is considered strong by the authors? According to Figure 1c there is 10% deviation from Stokes' solution in the case of particles with D around 40 µm, and 20% in the case of particles with D around 80 µm. Especially the 10% deviation is not strong and is similar to the accuracy of the Clift and Gauvin drag coefficient expression.

  - Lines 68-70. The authors need to give details on the iteration method that has been used. They also need to be more precise on the number of iterations that are needed for the solution of Eq. 1. There are several root finding algorithms that can be extremely robust (e.g. Brent's algorithm) or extremely slow (e.g. bisection method).

- Section 4.
  - Line 104. The iterative method should be properly presented and referenced, because the presented reference of van Boxel (1998) does not describe this method.

- Section 5.

- The authors need to present more clearly the significance of this work. The derived mathematical expression is valid only in the case of spherical particles, without taking account the slip correction factor for low Reynolds numbers, and by considering just the gravity and the drag forces. This means that it cannot be generalized to other shapes, and it is not valid when other forces (e.g. the electrical forces) act on the particle. So, what is the benefit of using this expression of limited applicability? What is the computational time gain against robust iterative numerical methods that can solve more general problems?

- Line 144. The slip correction factor should be properly introduced and described.

- Line 145. The Knudsen number should be properly introduced, defined and referenced.

Technical corrections

- Line 10. computanionnally -> computationally.

- Line 61. Proper reference of van Boxel is missing.

- Line 86. "...the particle if it would have if it would be falling..." -> "...the particle it would have if it would be falling...".

- Line 150. excentricity -> eccentricity.