

Response to Reviewer # 1 Comments

We sincerely thank Reviewer # 1 for the careful and critical reading of our manuscript and for his respected suggestions. Below we address each point in detail.

Major Comments

1. Novelty vs Paper I

2. Abstract focus

3. Length and role of Section 3

All three points revolve around similar ideas. The manuscript does not clearly distinguish new contributions from Paper I; the SK results may already be implicit. In the revised manuscript, we will focus more on the results, discussion, and comparison between the modified and standard kappa distributions. This will be achieved by removing or shortening parts that were already presented in Paper I. The revised manuscript also emphasize motivation and context rather than methodology.

4. Length and redundancy of Section 2

In the revised manuscript, We will move Table 1 to an appendix and try to make the section shorter.

5. Interpretation of Figure 10 and comparison with literature

In the manuscript, we compared our results for the standard Kappa distribution with the only available reference that, to our knowledge, has calculated the transport coefficients for the same distribution. The comparison shows agreement in behavior.

A similar approach was used in Paper I, where a comparison was made between the transport coefficients for the modified Kappa distribution from our work and those obtained using other models that employ more advanced collision terms than the Krook model, but less complex than the Boltzmann collision term. These studies also exhibited similar behavior (see Fig. 7 in Jweiles et al., 2025). Therefore, the literature supports the validity of our results for both distributions considered separately.

Furthermore, to our knowledge, no comparison of transport coefficients between the two distributions has been made, except for Husidic et al. (2021). A discussion will be added in the revised manuscript to explain why the ordering differs from that reported in Husidic et al. (2021).

6. Introduction and the Motivation for SK

In the revised manuscript, we will add a discussion on why SK is needed and whether it is more realistic, along with references to works where SK has been used successfully.

7. κ -independence of thermoelectric coefficient

This is the most important and critical point in the review, so we thank the reviewer for noticing it and bringing it up, as it has a high impact on the results. This change affects the kappa dependency of the thermoelectric coefficient. The comment highlights something important that we did not take into account when writing the five-moment approximation system, namely that the temperature should have a kappa dependency, which results in a change in the thermoelectric coefficient. In the revised manuscript, we will address this problem along with the updated five-moment approximation system and the revised kappa-dependent thermoelectric coefficient.

Minor Points and Technical Corrections

All minor comments Technical Corrections have been carefully considered and will be implemented where possible in the revised manuscript, including corrections to typographical errors and improvements to clarity and presentation.

We thank the reviewer again for the thorough and insightful comments. The suggested revisions will significantly improve the clarity, structure, and scientific positioning of the manuscript.