SAIP 2019 Proceeding: reply to referee report.

Title: Third order dissipative fluid dynamics and the Bjorken scaling solution.

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Q1) On page 2, starting with Eqs. (5,6), the meaning of a lot of symbols are not explained (a, A_0, \int dw…,). Why is the degeneracy factor A_0 multiplied into the distribution function f rather than into the phase-space integration measure? The way they do it in (6) requires dividing it out again in the off-equilibrium corrections \Delta below (6) and under the logarithm in the entropy definition (9) which just clogs up the notation. Eq. (9) also appears to missing something because I can't seem to get it into the standard form f ln f +/- (1 +/- f) ln (1 +/- f).

A) The referee is correct in pointing out the mistakes. There were typographical mistakes **in Eq. 9.** We have rectified that. Also definition of "A_0" containing degeneracy factor has been added in the text. In our case we have included degeneracy factor in distribution rather than into phase-space integration. It's a convention considered throughout our calculation.

Q2) What is y(x, p) in (11) referring to?

A) Eq. 11 for y(x, p) has been removed for consistency. Detailed calculation and definitions have been shown in the paper (Ref. [28]).

Please note that Eq. 12 is now Eq.11.

Q3) Going from (5) + (10) to (12) requires matching the three \epsilon's in (10) (scalar, vector, tensor) to bulk viscous pressure, heat flow, and shear stress tensor. The procedure how this is done in [24] should at least be mentioned, even if there is no space to show the derivation in detail

And

Q4) A few words how to get from (12) to (13) might be appreciated. Again no derivation but some text that explains the logic and assumptions made.

A) We regret for not being able to show the full calculation. However we have added a few lines to illustrate our methods. For detail information we have added a new reference, Ref. [28].

Please note that Ref. [28] in earlier version is now Ref. [29]

Q5) Before showing plots of solutions of (13) with previous work, it should be discussed how the form of (13) differs from the corresponding equation in Jaiswal's and El's work. The various terms in (13) are multiplied with transport coefficients that must come from somewhere. Are the authors calculating them from kinetic theory, and under what assumptions (massless Boltzmann gas or something else)?

A) A. Jaiswal et al. and other earlier works used Kinetic theory approach for Boltzmann transport equation in relaxation time approximation (BTE-RTA). The current work is an effective theory and used thermodynamic principles along with Grad's 14-moments approximation. A few lines have been added in discussion section.

Q6) Below (14) they say that the are using T \tau_\pi = 6 \eta/s (I rearranged what they say into this form) instead of the nowadays favored "modern" kinetic theory value where 6 is replaced by 5. Why ?

A) The referee has correctly pointed out that in our case T * \tau_\pi = 6 \eta/s. This is because in our case the coefficient S_3^2 has been calculated in ultra-relativistic scenario and shown to be $^3/_{4P}$. The EoS considered here is $\varepsilon = 3P$. Thus the T * \tau_\pi might depend on initial assumptions, equation of state and coefficients.

Q7) Basically I believe that the difference between the authors' solutions of (13) and the previously published works differ by the choice of second- and third-order transport coefficients. The effect of such differences on the evolution of the shear stress is an eminently important subject of interest because it gives a feeling for theoretical uncertainties associated with different choices of the form of third-order hydro. This may be stated more prominently.

A) A few lines have been added in the discussion section as per suggestions from referee/s. For more discussion we may refer to Ref. [28] in the manuscript.

Q8) There is also a (numerically) exact solution available for the evolution of \pi in the underlying Boltzmann theory. Could the authors perhaps include it in Figures 1 and 2 as an exact reference curve? Could Figs. 1 and 2 be combined into a single figure which could be made a bit larger?

A) Figure 1 has been kept intact. Figure 2 has been changed to include available BAMPS transport theory results. Figure 2 can now be used to compare effective third order theory to compare with solution of Boltzmann transport equation. Lines have been added in the discussion section.

Q9) The statement that in ideal fluid dynamics energy density drops like 1/\tau (line 3 on page 5) is wrong (the power is -4/3).

A) As correctly pointed out by referee, this is a typographical mistake and has been corrected in the revised manuscript.

We thank referee and editor for taking out their time and sending us questions and valuable suggestions. We have tried to answer the questions in best possible way and made corrections to our paper. Hopefully the present revised manuscript would be accepted for publication in the proceedings.

Thankfully

Authors.