Reviewer #1: The paper shows and explains almost all essential information, but some slight changes in content's arrangement are necessary:

- Chapter 3.3 and 4.2: Why don´t you describe briefly each test in chapter 3.3 and the ANN-test in chapter 4.2 to avoid an appendix?

Thank you for this suggestion! In the course of writing this paper we already had a version without appendix but opted for the current arrangement for sake of paper shortness. With your estimation in hand we will switch back to this original arrangement.

- Chapter 4.3: It would be good, if the particle behavior is analyzed first before the model is selected. I suggest to change the method in this direction.

We totally agree with these critics and we admit that we failed to highlight this in the paper. Of course, the principle particle behaviour has to be defined before we try to identify any contact parameters associated with a contact model picturing this specific behaviour. If we try to identify parameters for an elastic contact model in a system of non-elastic particles, this ANN approach will fail. So choosing appropriate contact models is an essential pre-requisite for contact parameter identification by means of ANN.

In the revised manuscript we tried to clarify this in the introduction and in the Section about the DEM simulations.

- Chapter 4.3: As the contact model chosen is a non-linear hertzian model and technically the coefficient of restitution is a damping factor used to reduce the energy of the system one question is, if the particles are really elastic in this stress regime? At which point do you proof the particles behaviour?

Once again we agree that we have to define the functional particle behaviour before we go for parameter identification. In our case we put our focus on the methodology of parameter identification by help of ANN based on the assumption on a given functional particle behaviour. In principle this method of parameter identification can be applied to alternative functional particle contact laws without any changes.

In the revised manuscript we highlight the assumptions on the functional particle behaviour we have made.

- Chapter 4.3: As ANN is trained by adjusting particle parameters, the stress and shear regime as well as particle type (elastic) should be addressed. That will pose as a major factor while training.

Our idea is to compare DEM predictions to results from macroscopic experiments, which are performed in a specific flow regime. In general it is not possible to extrapolate information to other regimes. We presented our ANN identification approach for shear cell operation with 10.000 Pa normal loads. If we perform the same procedure with 1.000 Pa normal loads, we obtain slightly different parameter sets. This, in turn, gives an indication that the functional particle behaviour, we have chosen for the DEM simulations is not able to correctly predict both macroscopic flow regimes. However, in this case we can argue that our ANN parameter identification approach can help in evaluating the predictive capability of some functional particle behaviour. Is a given functional particle behaviour able to reproduce different macroscopic flow regimes?

In the revised manuscript we included these considerations in the section of interpretation of ANN results. This includes an additional plot for the case of 1.000 Pa normal loads. We appreciate these reviewer’s comments!

- Chapter 4.3, page 10 bottom "Thus, it could be effectively handled for a wide range of bulk materials": Similar to the comments above, there is no information at all about the granular material, whose behaviour determines the contact model chosen.

We re-formulated this sentence in order to address the concerns pointed out above.

- As the network was trained on AoR and shear cell, it would be good to see how the results from another quasi static experiment can be reproduced like uni-axial tester (unconfined yield stress).

Unfortunately, as a research group we don’t have access to a uni-axial tester. However, we believe, that the general methodology presented in this paper, can be readily applied to other macroscopic flow situations (keeping in mind the general assumptions of functional particle behaviour, which have to be made beforehand).

Reviewer #2: This manuscript presents an interesting study on using artificial neutral networks (ANN) to identify the simulation parameters used in DEM simulations of granular materials. Granular materials are notorious for the complicated dependences of their macro4scopic behaviours on the material properties. DEM is an effective tool to underneath such relationships, while the simulations are rather computational demanding, especially in parametric studies. ANN can help reduce the number of numerical experiments. However, in this manuscript, the ANN is used to identify the simulation parameters, which is not so sound. Specifically, several critical issues are discussed below:

We would like to thank the review for his/her comments! These are very valuable for us, since they provide a completely different view on our topic. In answering to the reviewer’s comments we will first explain our point of view and then outline, how we modified our manuscript accordingly.

1. DEM is a reliable model due to that it requires few empirical parameters. Actually, most parameters in the model are physical measurable, such as the sliding friction coefficient, restitution coefficient, Young's modulus, etc. The rolling friction coefficient, although normally as an empirical and fitting parameter, also has its physical meanings. If the parameters always need to be determined by using an ANN, the DEM model may lose its advantage on the reliability.

As academic harbour of the prominent open-source DEM software LIGGGHTS, we do believe that DEM simulations are reliable! We are aware of dozens of universities, major companies and research institutions, which are using our code successfully. However, saying this, we are also aware of the difficulties in finding appropriate parameters for the contact laws (once you have identified the overall material behaviour and granular flow regime, see comment of first reviewer). We agree with the reviewer that there are ways to determine contact parameters directly by measuring material properties or by performing particle based experiments. However, we made the experience that these methodologies are not so easy to apply for those who are just using DEM as a simulation tool. You can easily download our DEM software, but you cannot download all the measuring equipment needed to determine those simulation parameters physically. In this sense we intend to provide an alternative methodology to access those parameters by just a couple of macroscopic calibration experiments.

In the revised manuscript we point out that there are alternative ways to determine most of the simulation parameters directly. However in case of rolling friction, we stick to our opinion that it is very difficult (if not impossible) to link the rolling friction parameter to the non-sphericity of the particle.

2. On the other hand, there are a number of studies on determining the parameters by theoretical analysis and/or using multi-scale methods in literatures, e.g., trying to establish the dependency of COR on the impact velocity and link the rolling friction with the material properties. These methods are more scientifically acceptable as they are trying to make DEM more fundamentally reliable. Of course the ANN could be just a different way, but at least it should be compared to these methods.

See comment above. In the revised manuscript we oppose our approach to these direct measurement methods.

3. It is not clear which parameters are determined by ANN, seemingly particle density is also included which should be a constant. In some places, particle density and bulk density are mixed up. On the other hand, some other material properties, such as size distribution and cohesion, are not considered in this work, it is questionable that if the method in this work can be really general for different granular materials.

In our opinion particle density is not a constant since it depends on the particle porosity. In the revised manuscript we explicitly mention the meaning of particle density. Further we tried to be consistent in the use of different densities, i.e. particle density, material density and bulk density.

In summary, the combination of DEM and ANN is an interesting attempt, but the combination way in this work is more likely to compromise the rigor of the model, rather than help solve the real difficulties.

I hope that we could clarify our intention in the revised manuscript. Using ANN can be seen as an alternative route to assess DEM contact parameters without the need of detailed experiments. We agree with the reviewer that this methodology is not as sound as direct measurements (if they are possible, see comments on rolling friction above). But to our knowledge a significant portion of the DEM simulation community does not have access to measurement equipment needed for direct determination of contact parameters. For those ANN represents an attractive alternative to determine reasonable contact parameters.