

## Peer Review

# Review of: "Parameter Calibration for Johnson Cook and Preston-Tonks-Wallace Material Strength Models with Uncertainty Quantification"

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Comments on the manuscript "Parameter Calibration for Johnson Cook and Preston-Tonks-Wallace Material Strength Models with Uncertainty Quantification" (Ref: Qeios-755145)

In this work, the authors have calibrated the parameters of Johnson-Cook and Preston-Tonks-Wallace models when applied to model the true stress-strain curves of oxygen-free high purity copper (OFHC). The authors have used experimental data from quasi-static tests and split Hopkinson pressure bar tests to fit the model. The variational Bayesian approach has been used to quantify the uncertainty and the correlation between the parameters. The reviewer has the following comments.

1. The results presented by the authors are of interest to the readers. However, the method of presentation of the model, results, and discussion needs considerable improvement before the manuscript is accepted for publication. For example, the Preston-Tonks-Wallace model is not described before its parameters are tabulated. Moreover, the Bayesian calibration model needs to be presented in brief before presenting the results. It is not clear how the uncertainties (as presented in Fig. 1) are calculated. Similarly, please explain how the data in the correlation matrix are calculated.
2. The word 'Abstract' should be included at the beginning after the title. Please include an 'Introduction' section. Please include a detailed literature review in section 1, which should cover the latest work in this area.
3. There are many data for OFHC copper in the literature. Please compare your experimental data with those in the literature and check if there are any deviations and explain the same.

4. The experimental procedure should be presented clearly, including specimen details, loading rates, etc. For split Hopkinson pressure bar tests, please show the raw data and strain rate variation with time. The strain rates obtained from split Hopkinson pressure bar experiments are not clearly mentioned. In Fig. 4, the rates seem to be in the range of 1108 to 1752 per second, which are very close to each other. Please include data for some higher rates so that the parameter calibration shall be more accurate.

Please provide equation numbers on Page 1. The term 'sigma' should be written as equivalent stress. Please provide an appropriate reference to the JC equation on page 1.

Please include the Preston-Tonks-Wallace (PTW) equation and define all the terms on Page 2.

Please describe the Bayesian calibration model briefly on Page 2 and provide appropriate references.

Please include the JC and PTW model parameters in a table on Page 3.

It is not clear how the parameters of the JC and PTW models were assumed initially. Please compare the results of model parameters with data from the literature.

Please show experimental data clearly first in separate figures. It is mentioned that many quasi-static tests have been carried out. Please show the corresponding data and the statistical scatter. What is the rate of tests in quasi-static experiments?

The reference strain rate is taken as 1/s. It is usually taken as the rate of quasi-static tests.

The figures have sub-figures. Please include sub-figure numbers such as 3(a), 3(b), etc. Please elaborate on the results more. Fig. 3(a) shows that the initial JC parameters are not correct. Even Fig. 3(b) doesn't reproduce the experimental data well. Please quantify the error and report it in tabular form.

Fig. 4: The curves are crowded. Please choose an appropriate scale. Please show the whole range of the curve, similar to Fig. 3. Why is one dotted line an outlier in Fig. 4(a)? Please explain.

What is the basis of Fig. 5? This seems to be extrapolated data. You don't have data for a  $1e12$  /s strain rate test. Please check. This figure is not required. Similar is the case with Fig. 10.

On page 7, results of the 77 K test have been removed, and data is fitted again. This means the models are not valid in the 77 K temperature range. Please elaborate.

Please show the differences in the model parameters for results with and without 77 K in a table.

Please improve Figs. 8 and 9 along similar lines as previously mentioned.

The conclusion section should be rewritten. Please include some important contributions from this work in bulleted form.

The novelty of the work should be presented clearly in Section 1 after a thorough review of the literature.

The method of referencing is not appropriate. Please check 'a,b.' etc. in the authors' surnames. It seems these are copied directly from the paper. The details of sources are not provided in many places (for example, Ref. 3). Is the reference list generated by AI? Please check.

The manuscript needs thorough revision and rearrangement of the description of the method and the results. The novelty of the work should be highlighted. Please follow a proper format for presenting the results and other details.

## **Declarations**

**Potential competing interests:** No potential competing interests to declare.