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Peer Review

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

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The article presents the calibration of parameters for two material strength models — Johnson-Cook (JC) and Preston-Tonks-Wallace (PTW) — for oxygen-free high-conductivity copper (OFHC), using a variational Bayesian approach while accounting for parameter uncertainty and correlations.

Data from 11 Hopkinson bar experiments and 5 quasi-static tests were used, covering a temperature range from 77 K to 873 K and logarithmic strain rates from -3 to 4. The parameters were calibrated using the variational Bayesian method, assuming normal distributions for both the priors and the likelihood. Physical constraints on the parameters (e.g., positivity) were taken into account, and the Laplace approximation was applied to estimate the covariance.

From a somewhat critical perspective, the value of Parameter A in the JC model after calibration (0.05 MPa, or even 6.2 MPa after excluding the 77 K data) falls outside the physically justified range (69–365 MPa for OFHC copper), which weakens the model's physical interpretability despite improved data fitting. The value of parameter A can be constrained to a more physically reasonable range during the model optimization process. Moreover, the experimental data cover a narrow temperature range — most of the Hopkinson data come from very similar temperatures (293–296 K), which may limit the generalizability of the results. Finally, the authors did not examine how the models with calibrated parameters perform outside the training set. The problem can be addressed by validation on an independent set of experiments or by defining a calibration (training) set — e.g., 70–80% of the data — with the remaining data used for verification.

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Another, more editorial, remark concerns the listing of model parameters in plain text rather than presenting them in a table. Using a table would have provided a clearer and more structured form of data presentation.

Nevertheless, the comments I have raised do not change the fact that the article is a thorough and well-executed research study that contributes meaningfully to the field of constitutive material modeling. The minor reservations pertain mainly to the physical interpretation and limited validation.

Declarations

Potential competing interests: No potential competing interests to declare.