

Machine learning for parameter identification and model reduction of gradient-enhanced damage models for metal forming processes

Wednesday, July 29, 2020 7:30 PM (1 hour)

Until now, only classical approaches for the parameter identification of gradient-enhanced damage models combined with e.g. finite plasticity or rate-dependent phenomena are used in order to characterize the damage evolution in metal forming processes. In the future, the models will be extended to simulate hot forming processes. Considering the increasingly complex material models with significant numbers of parameters, the capabilities of machine learning techniques shall be examined for this application. Later on, considering the complex boundary value problems of the different processes, model reduction will be used to decrease the computational cost of the finite element simulations while maintaining the accuracy of micro-mechanical material models to characterize the damage evolution in the processes. Therefore, a neural network will be trained with the constitutive response of the micro-mechanical material models.

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Session Classification: Posters 2