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A machine-learning-based approach for the elastoplastic response of polycrystalline materials

Monday, 11 April 2022 19:00 (1h 30m)

We developed a machine-learning-based approach for solving computing the elastoplastic mechanical response of polycrystalline structures. In particular, a recursive deep neural network based on U-Net and applied recursively is proposed as a surrogate model for predicting the von Mises stress field under quasi-static tensile loading. We show that the model can accurately predict both the average response as well as the local von Mises stress field in the history-dependent elastoplastic problems. The trained model can predict the nonlinear mechanical response of any grain structure, orders of magnitude faster than conventional numerical approaches such as the spectral solvers.

Poster title

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