

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

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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

Poster

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