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Exploring Spectral Methods for Fatigue Assessment in Elastic-Plastic Regimes

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This study explores the use of spectral methods for fatigue life assessment, considering the effects of material plasticity. While these methods are widely used for high-cycle fatigue in the linear elastic regime, their application to low-cycle fatigue remains more complex due to nonlinear material behaviour. By incorporating models such as Neuber's rule and the Ramberg-Osgood formulation, this work examines how spectral methods can be adapted to account for elastic-plastic effects. A comparison is made between fatigue life estimations obtained with spectral approaches and results from time-domain nonlinear simulations. The study provides insights into the applicability of strain-based spectral methods, contributing to a better understanding of their potential and limitations in fatigue assessment.

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