

Title: Methodologies for Prediction of Hydrogen-Assisted Fatigue in Piping Components using a Phase-Field Approach

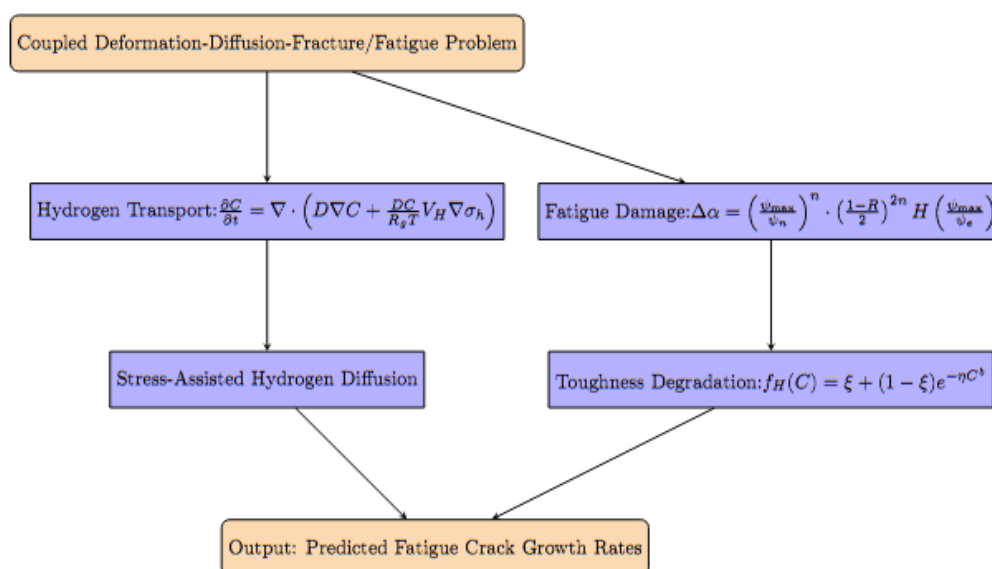
Duration: April 2024 to September 2025

Objectives:

- A phase field formulation for hydrogen-assisted fatigue
- Generation of Paris' law type behaviour and S-N curve from numerical simulations for cases of hydrogen-assisted fatigue
- Evaluation of fitting parameters for Paris' law and S-curve
- Remaining life prediction for a specimen for arbitrary loading patterns, geometries, and environments

Progress Highlights:

- ❖ A fatigue crack growth model using the phase-field method was developed, incorporating an additional dissipative term in the energy balance to account for energy loss during crack growth.
- ❖ Simulations indicated an exponential correlation between crack growth and the number of load cycles.



Flow diagram of methodology for prediction of hydrogen-assisted fatigue

Future Programme:

- Strategy for evaluation of length scale parameter for the problem of crack initiation
- Modeling Crack nucleation from notch for monotonic loading

Project Leader

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Team:

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