Experimental and numerical plasticity analysis of heterogeneous welds

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Analysis of plastic deformations plays an important role in assessment of limit loads

Numerical analysis
- Single edge notched tension (SE(T)) tests
- Material properties assigned from HV maps

Experimental analysis
- Full-field strain analysis to derive paths of maximum equivalent strain
- Double clip gauges to measure crack tip opening displacement (CTOD)
- SE(T) with speckle pattern for DIC

Finite element model having complex strength heterogeneity

Digital Image Correlation (DIC) used to acquire deformations

Numerical results show good agreement with experiments

Plastic strains in simulations
Plastic strains in experiments

Study offers insight to include weld heterogeneity in simplified integrity assessment