

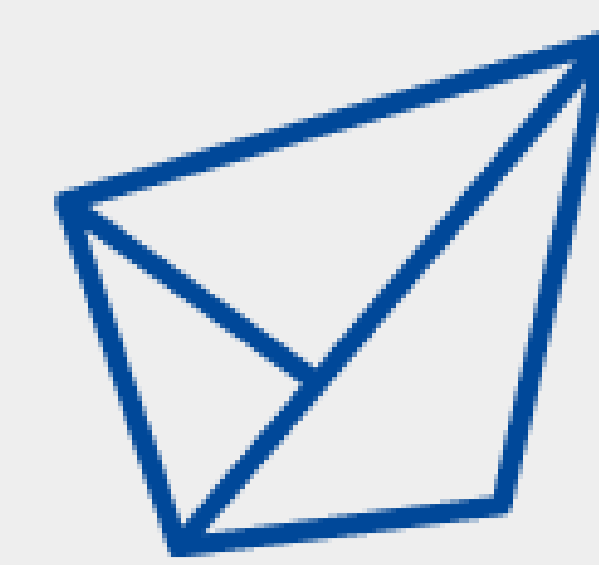
Project 7475 - PROMINENT

PRediction Of daMAGE evolution IN ENgineering sTructures

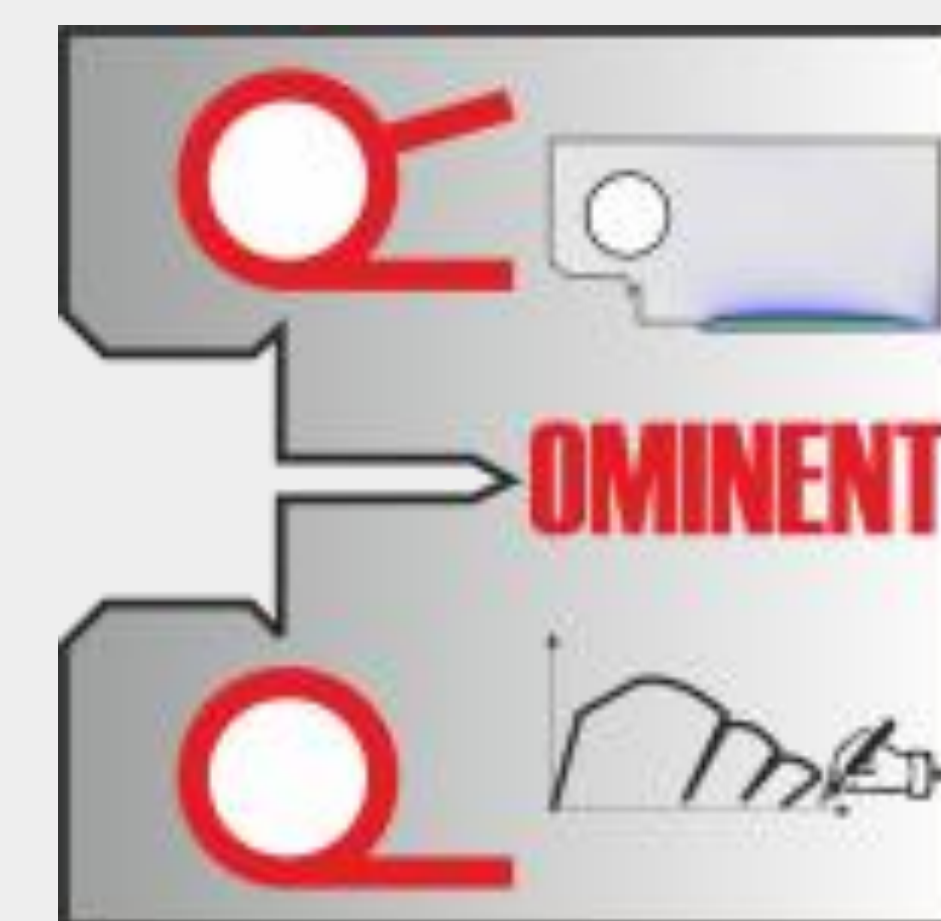
Faculty of Engineering University of Kragujevac

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<https://prominent.kg.ac.rs/>



Science Fund
of the Republic of Serbia



PAK-DAM

Advanced FEM Tool

Powered by
Phase-Field Damage
Model (PFDM)
Predicts: Damage initiation,
growth, and failure

Infrastructure Applications
• Concrete dams
• Bridges
• High-rise buildings



Automotive
Aerospace

Key Feature:
Accurate failure prediction
in metallic and concrete
structural components

PAK-DAM

ABOUT PROMINENT

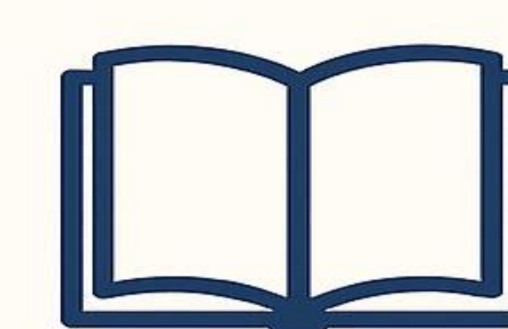


MAIN OBJECTIVE

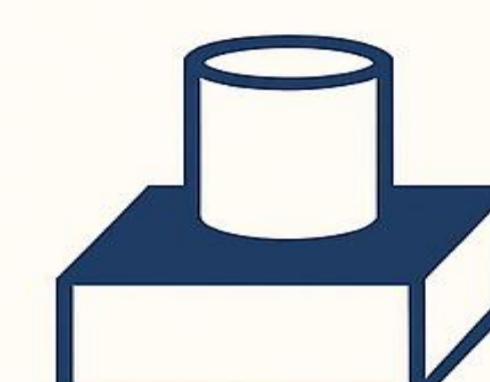
Enhance and simplify structural design and health monitoring of engineering structures by:

- ◆ Developing PAK-DAM – a software tool for predicting damage initiation and evolution
- ◆ Conducting material testing to determine parameters, calibrate models, and validate the tool's performance

PROMINENT RESULTS



Development of Theory, User, and Example Manuals for the PAK-DAM software tool



Expansion of experimental research capacity and advancement of testing techniques at partner institutions



Delivery of PAK-DAM source code and software executable for advanced structural design applications

Experimental Equipment and Testing



Figure 1. Control unit of the MATEST servo-hydraulic testing system – left; MATEST compression testing machine used for mechanical testing specimens – right



Figure 2. Prepared concrete specimens from the same batch for quasi-static compression testing

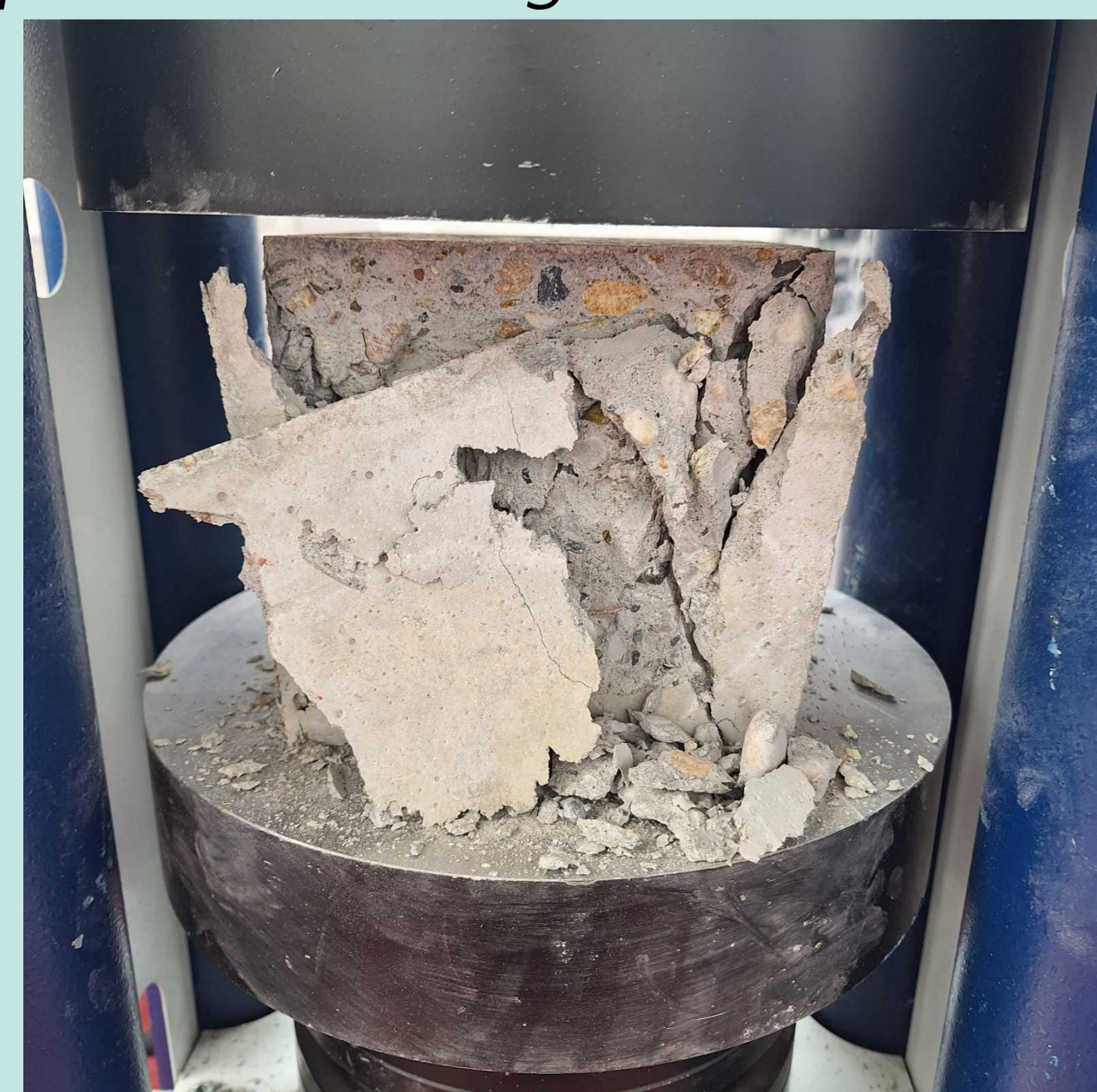


Figure 3. Concrete specimen positioned in the hydraulic press prior to testing – left; Concrete specimen after compression testing, showing crack formation and failure – right

Results

Paper title → "Phase-Field Simulation of Subloop Loading in TiNi SMA"

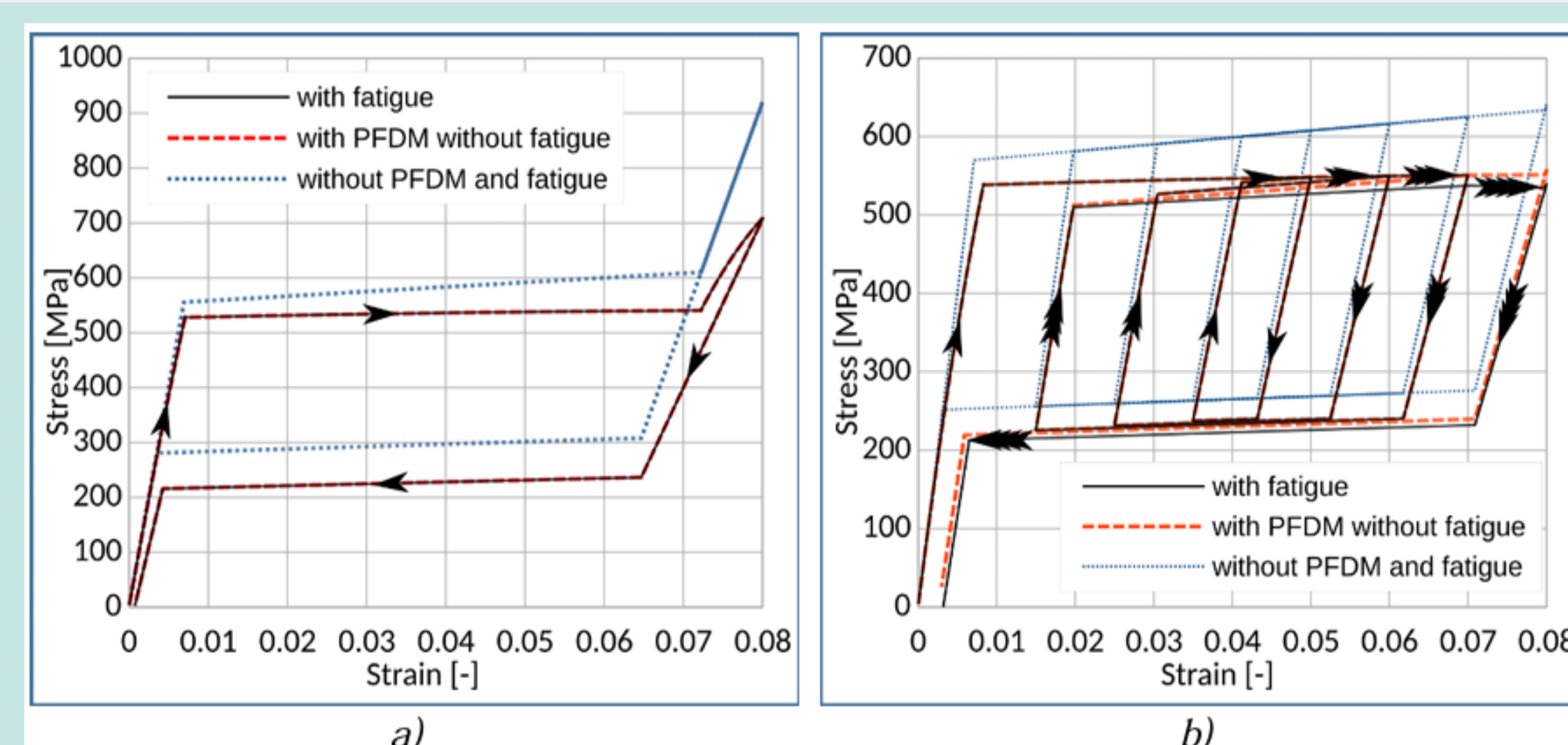


Figure 4. Stress-strain response for different options of PFDM and fatigue function implementation: a) full-loop loading; b) subloop loading

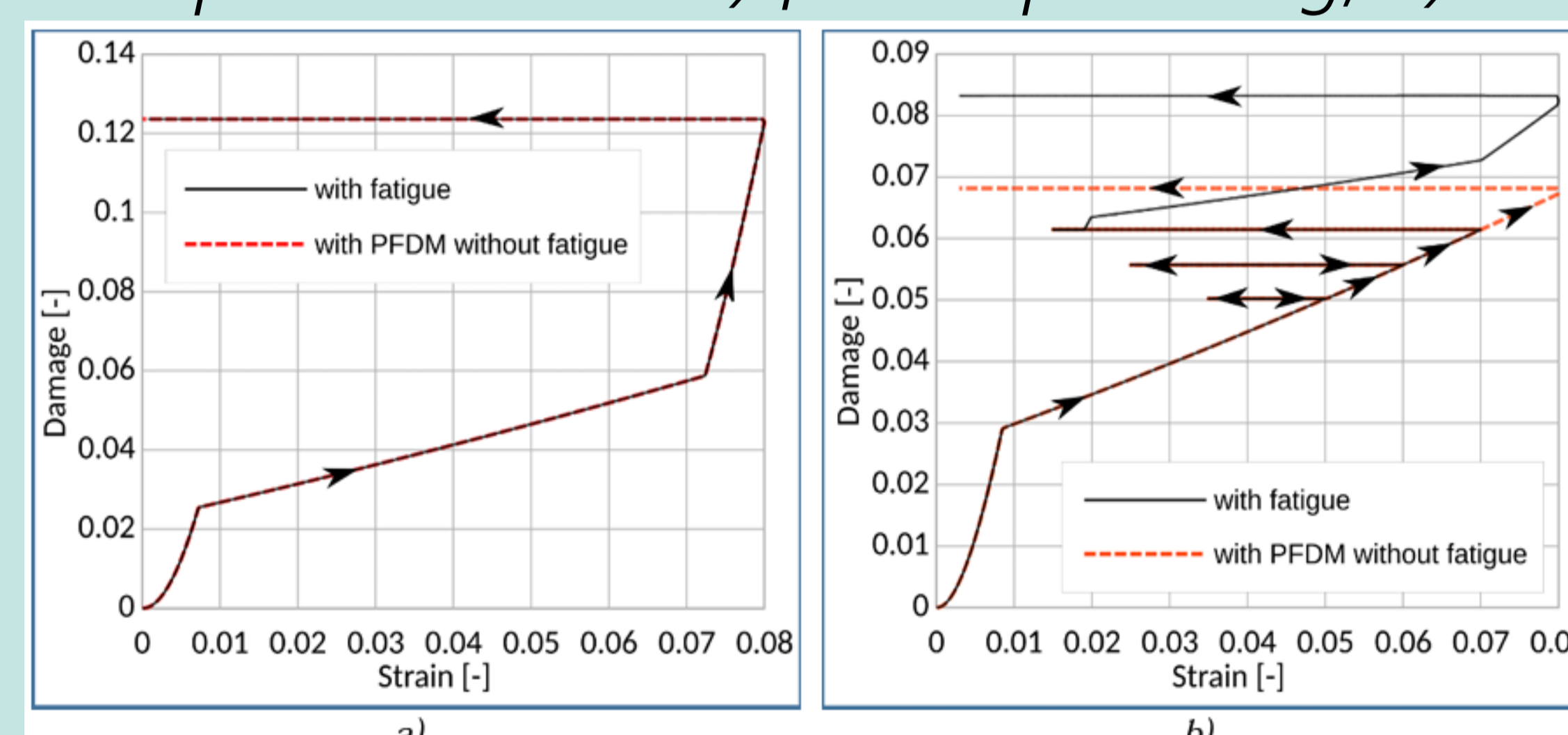


Figure 5. Damage-strain diagram for different options of PFDM and fatigue function implementation: a) full-loop loading; b) subloop loading

Paper title → "Experimental Characterization and Phase-Field Damage Modeling of Ductile Fracture in AISI 316L"

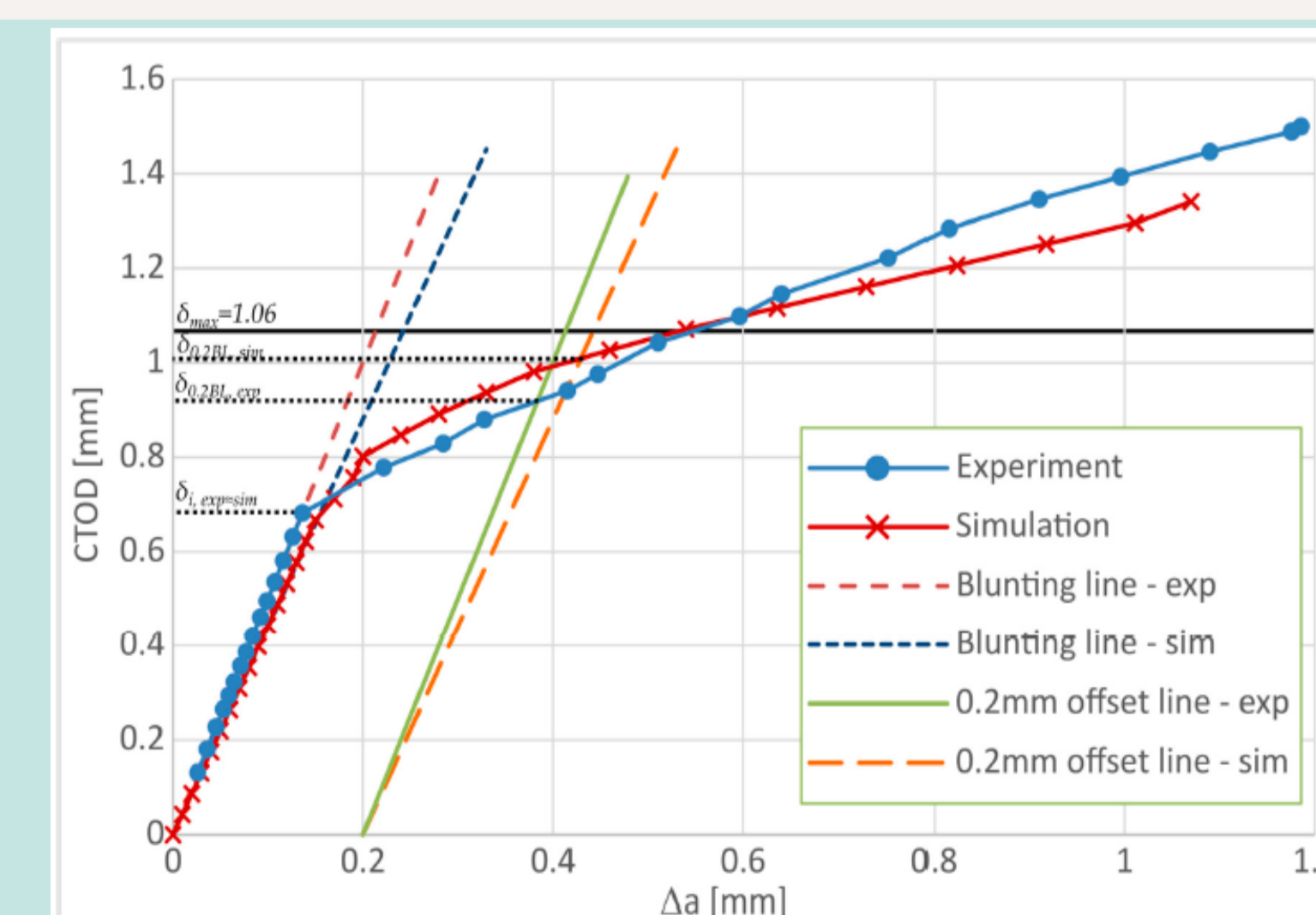


Figure 6. Crack-tip opening displacement vs. crack growth from the experiment and simulation results

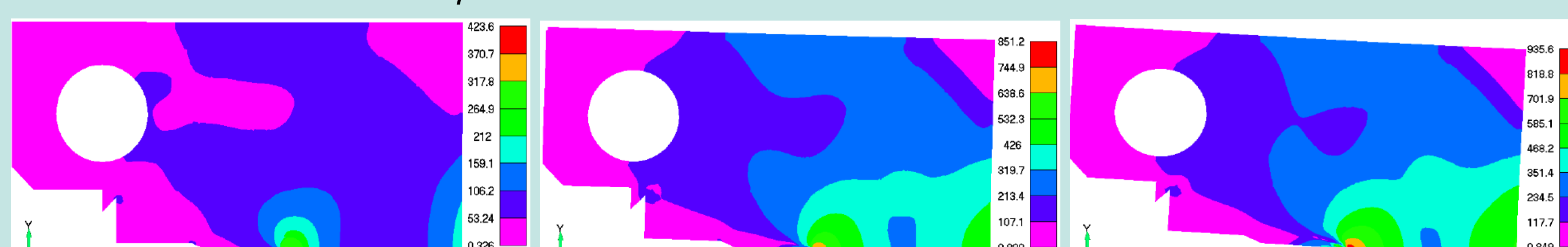


Figure 7. Equivalent stress in MPa at the 1st step – left; at the 15th step – middle; and at the 30th step – right