

# Automatic Cell Decomposition for the Discontinuous Finite Cell Method (DFCM)

**Project Characteristics**

Modeling:

Mathematics:

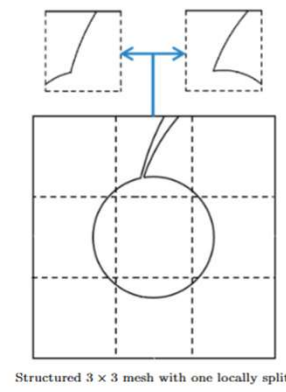
Programming:

Science:

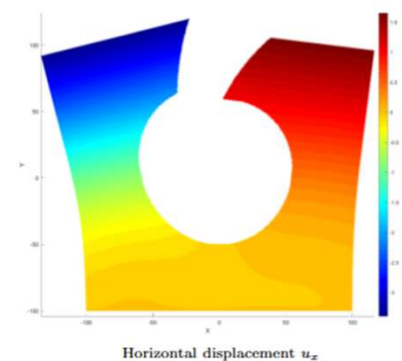
Design and implement an automatic cell decomposition strategy for multi-material cells and cells containing multiple material islands within the DFCM framework:

- Detect complex material configurations inside a finite cell,
- Decompose cells into suitable subcells or material-consistent regions,
- Preserve numerical stability and accuracy,
- Interface seamlessly with the DFCM formulation and flux coupling strategy
- Implementation of the proposed methods in provided **2D and 3D DFCM base codes**,
- Verification and testing using representative benchmark problems.

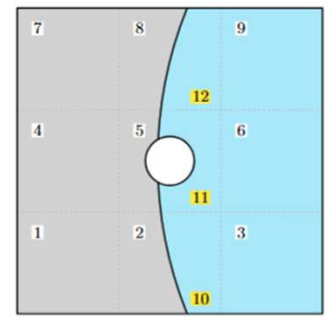
Core DFCM codes and example setups will be provided by the supervisor.



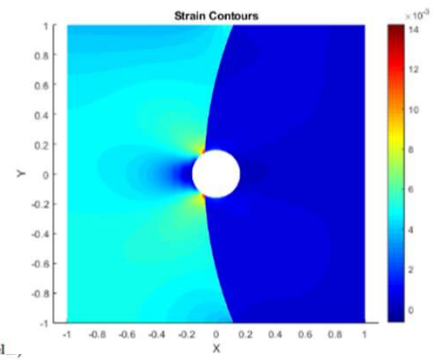
Structured 3 x 3 mesh with one locally split



Horizontal displacement  $u_x$



Structured 3 x 3 cells + 3 decomposed cells (total 12 cel...)



Reference: Parvizian et al, "Discontinuous Finite Cell Method", WCCM 2026

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