A review of Weak Dirichlet Boundary Conditions in Finite Cell Method (FCM)

Project Characteristics

Mechanics: ★★★☆☆
Mathematics: ★★★☆☆
Programming: ★★★★★

- The FCM is a powerful embedded domain method based on high order finite elements
- Embedded domain methods do not necessarily represent the underlying physical domain
- The original geometry is recovered at the integration level using adaptive methods

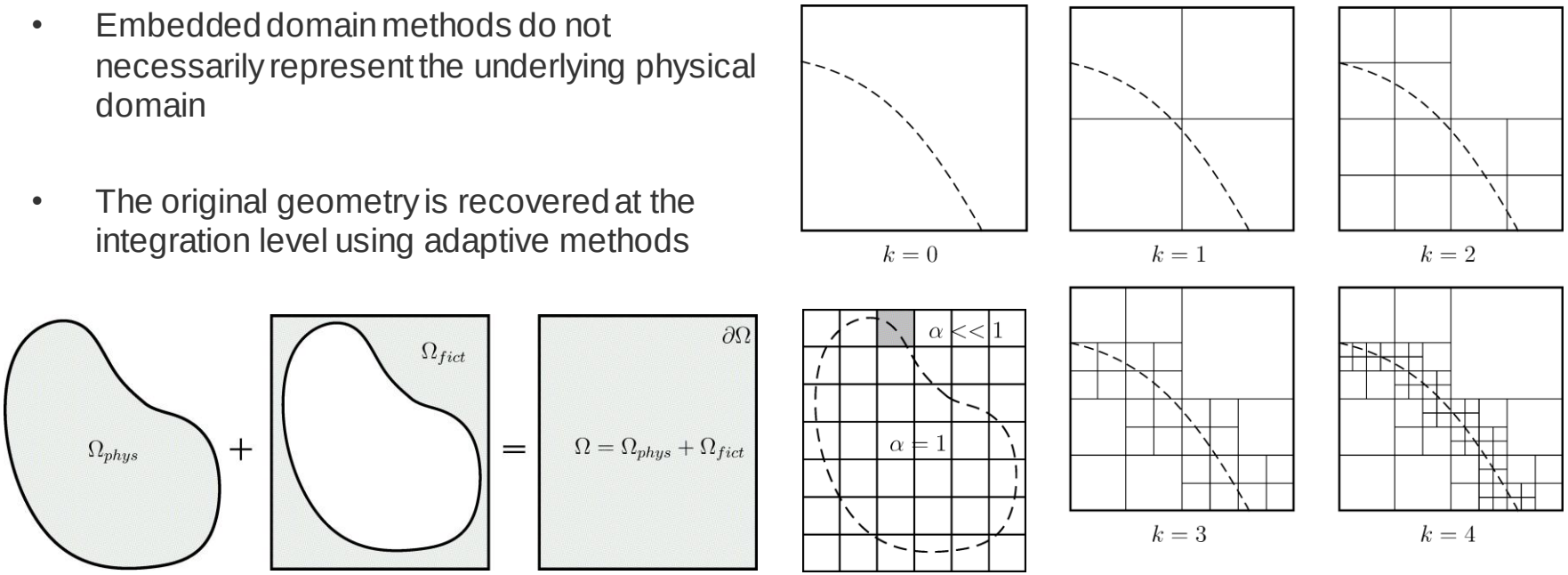

Fig 1. Finite cell mesh with geometric boundary and subcell structures for various adaptive integration level k

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- Challenge:
  - Imposing the Dirichlet boundary conditions
- Your Task:
  - Implementing the Lagrange Multiplier Method
  - Investigating different stabilization techniques for Nitsche's Method
  - Comparing the results
- Programming language: MATLAB (FCM Toolbox)
- What you will learn in this project:
  - How a finite element code works
  - Object-oriented programming with MATLAB

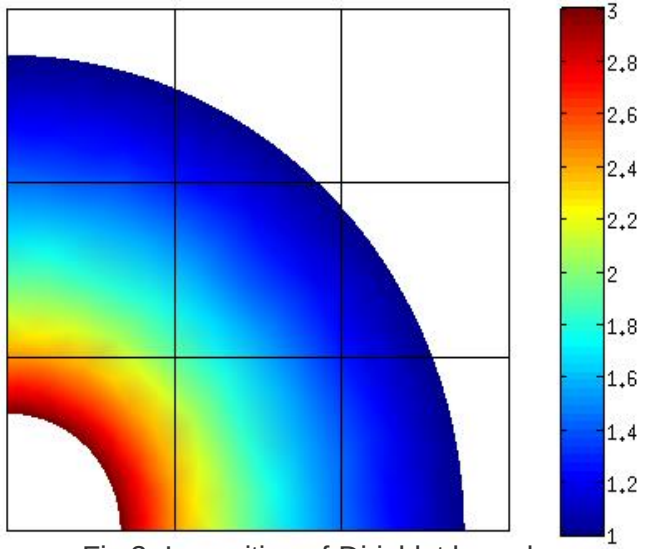

Fig 2. Imposition of Dirichlet boundary conditions on inner and outer ring