

Alain Combescure

X-FEM methods for fast fracture

- introduction
- basic fracture mechanics concepts: Local vs Energetic view of Fracture
- How to compute a cracked body with X-FEM ?
- Crack propagation modeling: static and dynamic cases. Tensile or shear fracture.
- X-FEM models: with or without crack tip function? Use of CZM at crack tip
- Time integration: explicit or implicit?
- Application examples and comparison with experiments.

Meshless methods for dynamic Fracture and fragmentation

- Local vision of fracture: interest and limitations
- Meshless methods: basic features notations and limits
- Crack initiation in meshless methods: localization control
- Crack propagation simulations
- Explicit time integration
- Special case of SPH shells
- Application examples
- Application to cracking fluid structure problems and comparison with experiments.

Nicolas Moës

From damage to fracture: numerical aspects part I, Monday :

- Different classical models of degradation in quasi-brittle models
- Griffith crack, cohesive zone and several
- non-local damage mechanics models
- the relationships between non-local damage mechanics models and the numerical implementation issues.

From damage to fracture: numerical aspects part II, Tuesday:

- Numerical aspects of the transition from damage to fracture
- the proper use of X-FEM in inserting cracks in damaged zones.

Stefan Löhnert

Multiscale methods for Fracture

- classical multiscale techniques and their limitations
- overview of multiscale techniques for fracture mechanics problems
- the multiscale projection method
- multiscale aggregating discontinuities and related techniques

Conditioning problems and stabilization techniques

- reasons for bad condition numbers within the XFEM/GFEM and their consequences
- overview of possible remedies and their properties
- the SXFEM for fracture mechanics
- direct approach to eliminate undesired small eigenvalues

Thomas Peter Fries

The XFEM in two-phase and free-surface flows

- Models for two-phase and free-surface flows
- XFEM-approximations
- Time integration in XFEM
- Iterative solvers and preconditioning and XFEM
- Surface tension effects
- Higher-order accurate XFEM for interfacial flows

N. Sukumar

I Quadrature methods for discontinuities and singularities, Part I (Monday)

- Overview of quadrature methods for integrating functions
- Quadrature schemes based on equivalent polynomials
- Numerical integration of homogeneous functions on polytopes
- Computation of weak form integrals in the X-FEM for discontinuous integrands

II Quadrature methods for discontinuities and singularities, Part II (Tuesday)

- Enrichment functions for elastic fracture in the X-FEM
- Overview of Duffy transformation and other mappings for weakly singular integrands
- Computation of weak form integrals in the X-FEM for weakly singular integrands