Understanding and modelling mechanisms and geometry effects in ductile to brittle transition

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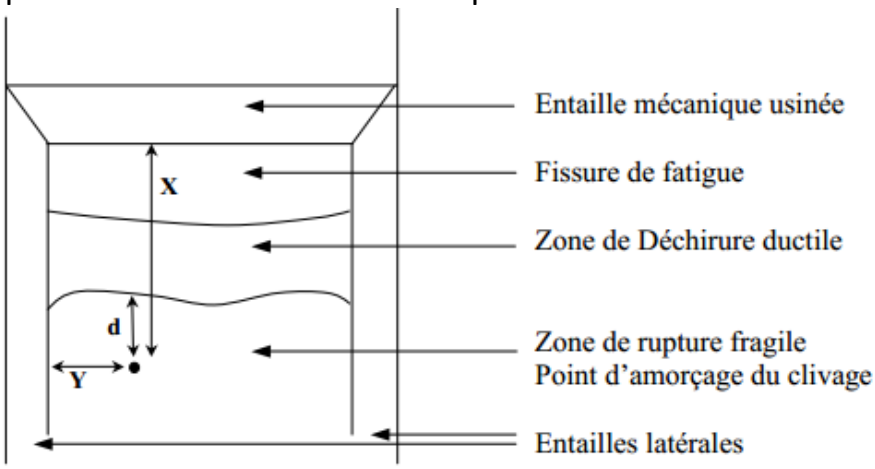
- Numerical convergence of the Beremin model for brittle fracture
- Implementing the ductile tearing GTN before the brittle fracture
- Experimental and numerical comparison of the results.



Abstract:

Brittle rupture in the transition region is preceded by significant ductile tearing. These rupture mechanisms are very different and require specific models to precisely describe both phases of crack propagation. It is in particular very important to precisely describe the stress field ahead of the propagating ductile crack as these fields are used as input data to evaluate brittle crack initiation. In order to develop and validate the use of these models, it is necessary to confront them to experimental results obtained at various temperature (to check to ability of the models to predict the change in rupture mechanism) on different geometries (to check the transferability between specimens and to a structure and to validate the understanding of the role of loading on fracture). The proposed methodology is based on two main research axes:

- Develop a strategy to model rupture in the transition region by combining a ductile damage model to a model for brittle fracture
- Conduct an experimental work program on a structural steel close to the steels used in french nuclear plants to validate the proposed modeling strategy. The program will include tests at various temperatures and on different specimen geometries.