Modelling Dynamic Fracture of Shells Filled with Fluid

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The paper is devoted to the presentation of simulation of dynamic fracture of shells filled with fluid. The proposed simulations are also carefully compared with experimental results.

The first part of the presentation shall be devoted to the presentation of the damage fracture transition in case of transient loadings. The implementation of these concepts in an SPH context shall then be introduced. The definition of a crack in an SPH structural modeling shall be presented. The extension of SPH method to shell formulation shall then be presented as well as the fracturing SPH shell strategy.

The finite element SPH coupled model for fluid structure interaction shall then be presented and explained. For instance one shall explain how the unilateral contacts are treated.

The method shall then be compared to a series of experiments. These comparison shall show the interest the potentials and the limits of such an approach. For instance one will show that the method is able to explain why the flow shows regularly spaced knots. The method also predicts the case of failure of the shell as well as the directions and length of cracks propagated by the fluid flow. The flow through the cracks is also predicted. On the other hand the long, rm pressure field in the fluid does not compare well with the experiments. This is due to the poor representation of the pressure field in the fluid model chosen into these simulations in case of low speed flows

References