

## DESCRIPTION OF INPUT FILES FOR XFEM ANALYSIS

- GGnodeX.** A list of nodes that belong to the enriched elements. These include all the enriched nodes plus some non-enriched nodes. An enrichment key is specified in this list: 0 for non-enriched nodes, 1 for Heaviside-enriched nodes and 2 for crack-tip-enriched nodes. In addition, signed distances to the nearest crack segment and to a line normal to the crack and passing through the crack-tip are stored.
- GGelemX.** A list of all the enriched elements. Flags are specified indicating whether the element needs subdivision or not (elements that share enriched nodes but are not intersected by the crack do not need to be subdivided). If the element is intersected by the crack, the type of subdivision is also indicated (e.g., subdivision either into triangles or into two quadrilaterals) together with the intersection coordinates. The same flag is used to indicate the crack-tip elements. These elements are always subdivided into triangles. For those elements that have at least one crack-tip enriched node (key=2), the number of the corresponding crack and the number of crack tip are also stored (maximum two tips per crack; no branched cracks are considered in this work).
- GGXYC.** It stores the coordinates of all vertices that describe each crack. During the crack growth, straight segments are added to the current crack. Therefore, the crack tips are always the first and last vertex of each crack list.
- GGinfoX.** A list containing the number of cracks, the maximum number of vertices for all cracks, the total number of enriched elements and the total number of nodes belonging to enriched elements.
- SETNodeX2dof, SETNodeX4dof, SETNodeX10dof.** These sets are lists containing the node numbers belonging to enriched elements. They are grouped according to the type of enrichment: non-enriched nodes (2 DOFs per node, key=0), Heaviside-enriched (4 DOFs per node, key=1) and crack-tip enriched (10 DOFs per node, key=2). The lists are written according to the Abaqus convention for node sets [5].
- TopNoX.** An element topology list (connectivity) of all the elements in the mesh, excluding the enriched elements. It is written according to Abaqus conventions.
- TopX.** The topology list for all the enriched elements. It is written according to Abaqus conventions.
- TopXTypeX.** Same as **TopX**, but substituting the node numbers by the corresponding enrichment key (0, 1 or 2).
- TopXoverlay.** Same as **TopX**, but increasing the element number by a sufficiently large amount (e.g., 1000000). This file will be used to generate duplicate elements with the same topology as the enriched elements (they share the same nodes with the same topology). These elements are called *overlay elements* in this work and are used for plotting and for contact analyses (see Section 3.5).