



Figure 1: Illustration of the species coupling in case of a coinciding interface. In the figure, the dashed interface lies on top of the edge between two cells. It is assumed that  $K_j$  in Equation ?? is the cell with the lower index and owns the coinciding interface. The affected edge  $\partial K_i \cap \partial K_j$  belongs to the species  $\mathfrak{A}$  and takes care of the coupling between cells  $K_{i, \mathfrak{A}}$  and  $K_{j, \mathfrak{A}}$ . The species are then coupled inside  $K_j$  via the interface, from the empty cell  $K_{j, \mathfrak{A}} = \emptyset$  to the full cell  $K_{j, \mathfrak{B}} = K_j$ . Finally, by performing the agglomeration, the discrete system is algebraically modified. This modification eliminates the (edge) contributions on  $\partial K_{j, \mathfrak{A}}$  of the empty cell and combines the cell and species coupling, establishing the connection between  $K_{i, \mathfrak{A}}$  and  $K_{j, \mathfrak{B}}$ . The lower part of the figure shows an exploded view of the situation to clarify the connectivity.