An often overlooked hidden requirement: Neighboring materials must be listed next to each other in *ALE_MULTI-MATERIAL_GROUP*
Interface Reconstruction

With the interface reconstruction, mixed elements are cut with a plane, separating the location of the different materials. The plane orientation is based on the gradient of the volume fraction field.

**example with two materials**

**element before mesh smoothing**

\[ \bar{\eta}_1^{n1} = 0.5 \quad \bar{\eta}_1^{n2} = 0.2 \]

\[ \eta_1^{old} = 0.8 \quad \eta_2^{old} = 0.2 \]

\[ \bar{\eta}_1^{n3} = 0.7 \quad \bar{\eta}_1^{n4} = 0.5 \]

**assumed distribution of materials**

\[ \hat{n} = \left\| \frac{\partial \bar{\eta}_1}{\partial x} \right\|^{-1} \cdot \frac{\partial \eta_1}{\partial x} = \frac{1}{\sqrt{2}} \left\{ \begin{array}{c} 1 \\ 1 \end{array} \right\} \]
Interface Reconstruction

LS-DYNA ALE interface reconstruction for each AMMG
1. Element volume fraction $\rightarrow$ Nodal volume fraction
2. Gradient of nodal volume fraction $\rightarrow$ interface normal
3. Move the cut interface until the volume cut is equal to the element volume fraction
4. The process repeats for each AMMG in the order it is defined in the *ALE_MULTI-MATERIAL_GROUP

The above shows two different setup for *ALE_MULTI-MATERIAL_GROUP. Which one is right? Why?
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