



Crack Propagation Direction

- First principal stress
for brittle fracture: crack initiation and propagation
- First principal strain
for ductile fracture: crack initiation and propagation
- Center of effective plastic strain/damage
for ductile fracture: crack propagation

$$\mathbf{x}_c = \frac{\sum_I \mathbf{x}_I A_I \varepsilon_I^p}{\sum_I A_I \varepsilon_I^p}$$

Integration point I located within the half circle ahead of the crack tip.

Radius of the half circle r is the same as the length scale for strain regularization.

