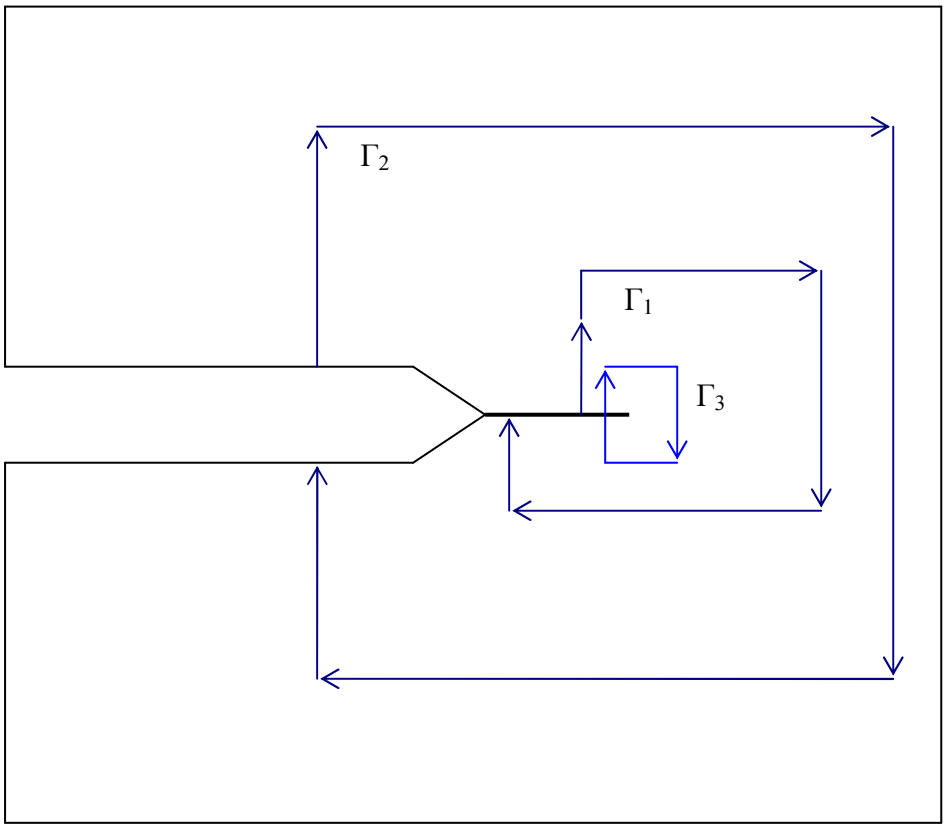
T73S02 Session 16 Homework (J Integrals)

Mentor Guide Question:-

1.7 Explain how a stress intensity factor could be determined from a finite element analysis

Numerical/Mathematical Questions:-

1) A finite element model of a compact tension specimen looks like this…



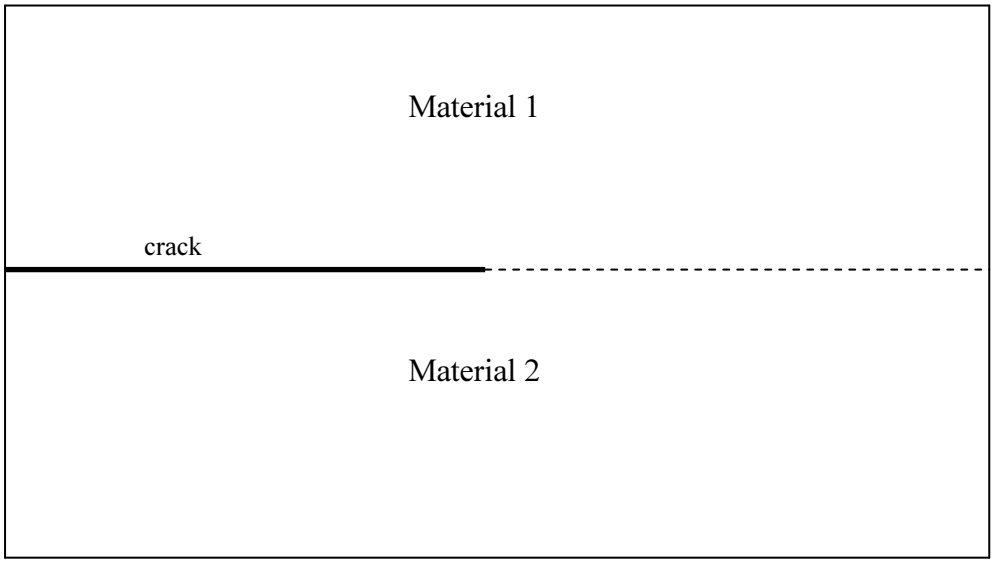
A monotonically increasing load is applied.

You find that the value of J given by ABAQUS is significantly different on the two contours Γ_1 and Γ_2. Should you have expected this, or is it indicative that the analysis is inaccurate, e.g., due to insufficient refinement?

You find that the value of J given by ABAQUS is significantly different on the two contours Γ_1 and Γ_3. Should you have expected this, or is it indicative that the analysis is inaccurate, e.g., due to insufficient refinement?

PTO…

2) A crack lies along the straight interface between two different materials, as shown below. Would you expect the J integral to be path independent (assuming monotonically increasing loads only)?



3) A crack runs perpendicular to the interface between two different materials. Would you expect the J integral to be path independent (assuming monotonically increasing loads only)?