

Figure 65. (a) 20-noded brick element with quarter-point nodes. (b) 15-noded wedge element with quarter-point nodes.

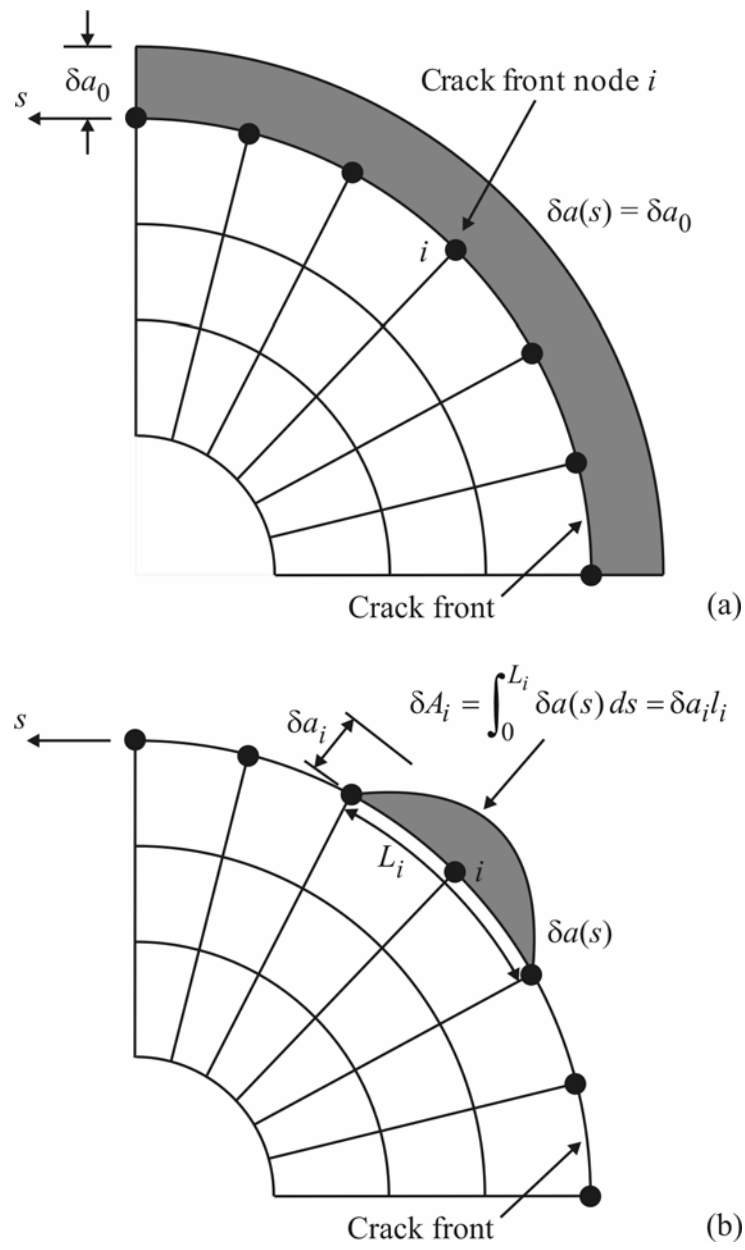
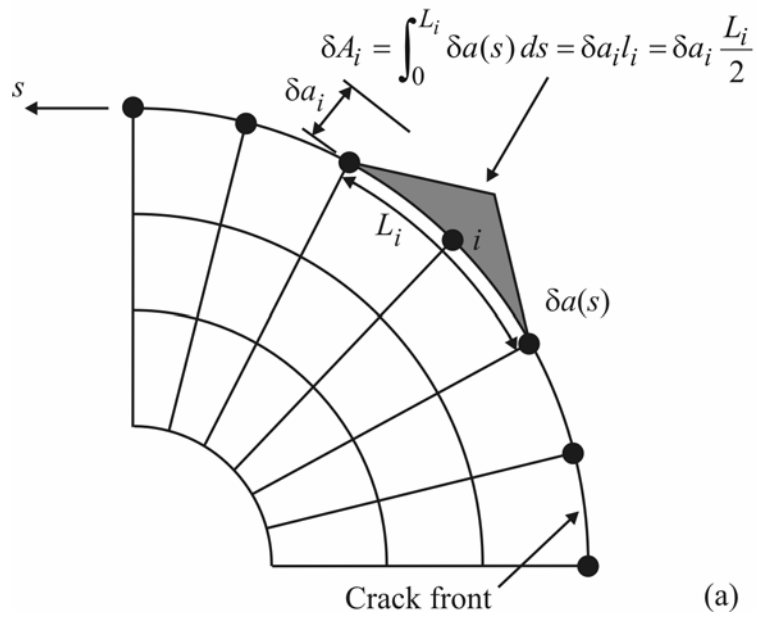
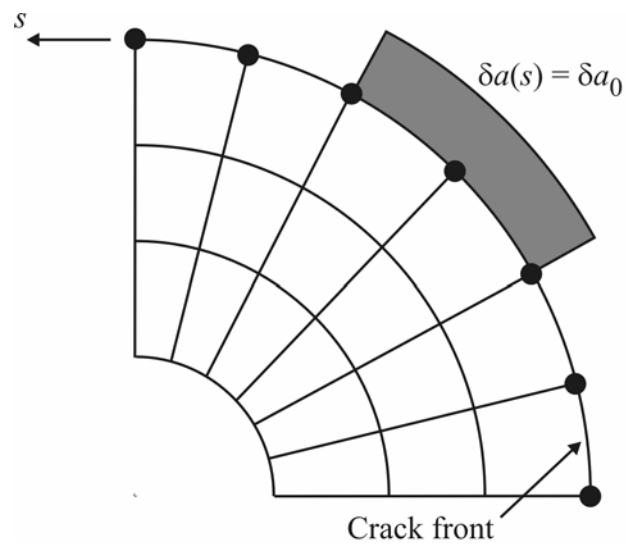


Figure 66. (a) Virtual crack extension for the definition of average energy release rate. (b)

Virtual crack extension for definition of local energy release rate.



(a)



(b)

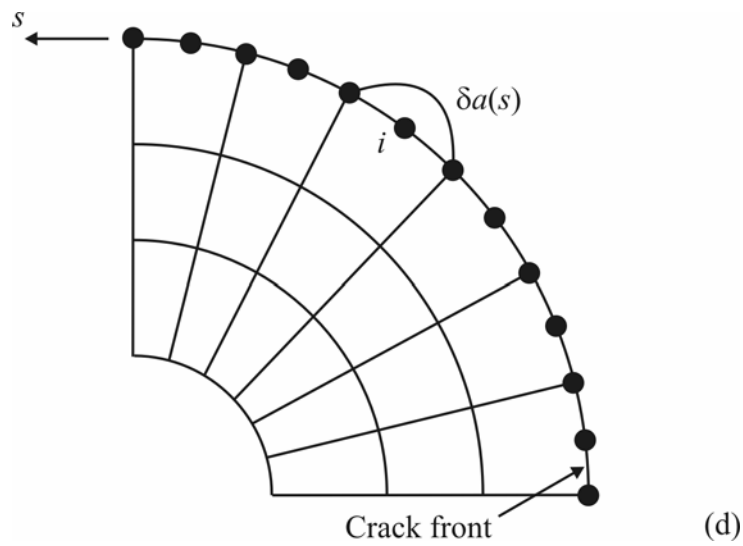
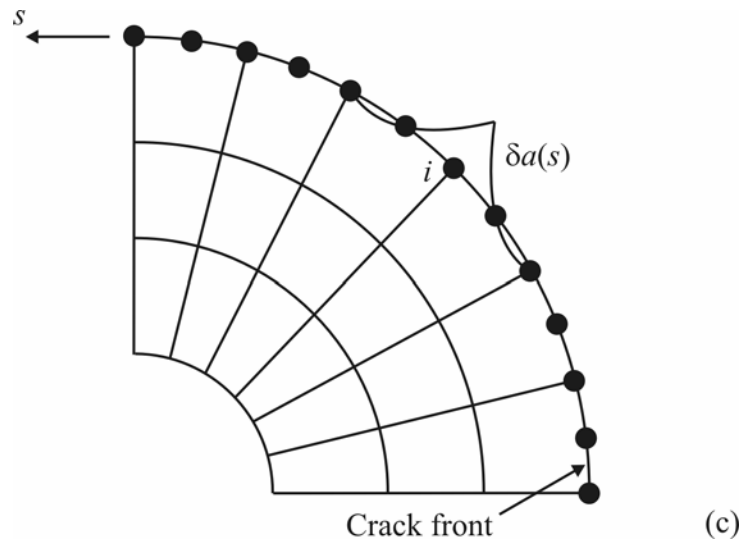


Figure 67. Various types of virtual crack front perturbations. (a) Linear. (b) Constant. (c) Quadratic spanning 2 elements. (d) Quadratic over one element at mid-side node.

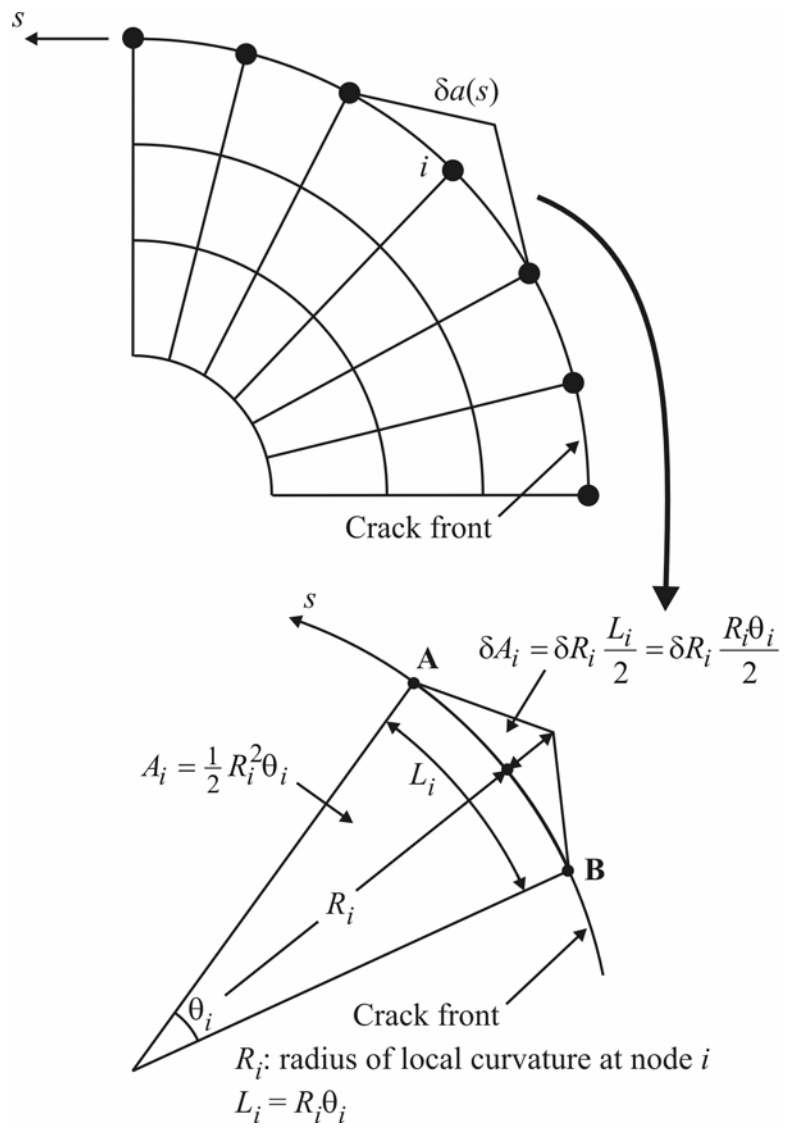


Figure 68. Virtual crack extension on a curved crack front segment.

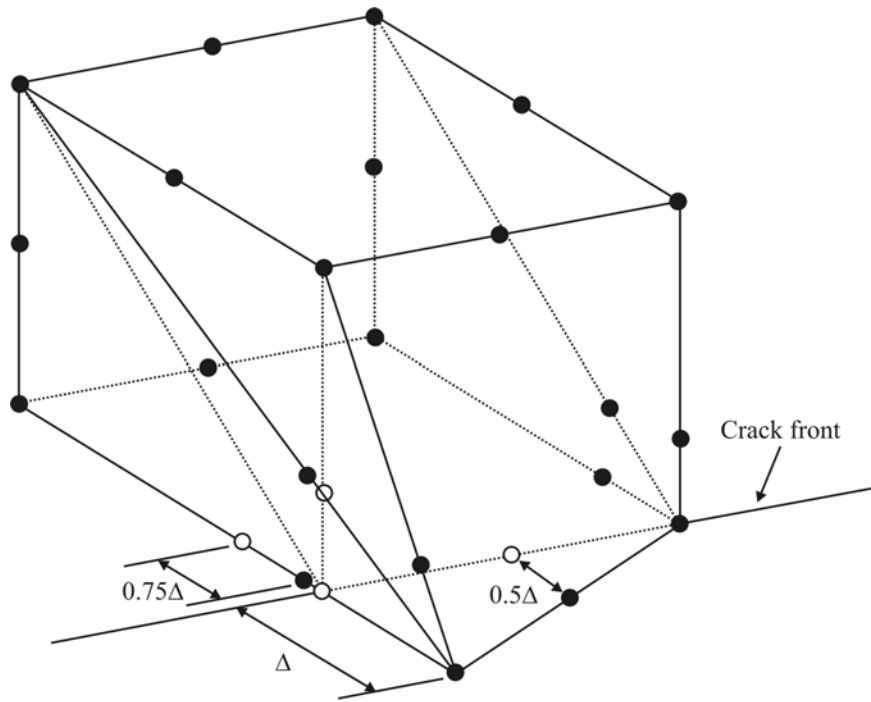


Figure 69. Mesh perturbation, Δ , in 15-noded wedge elements.

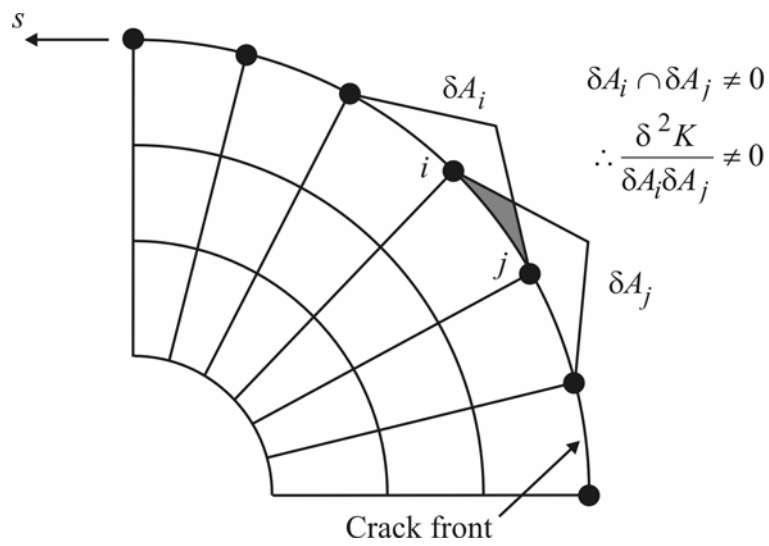
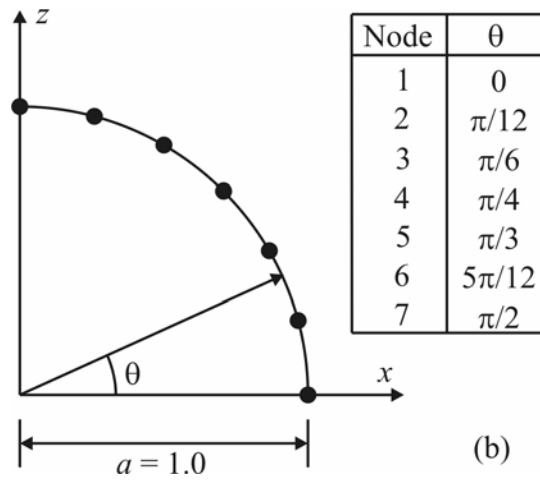
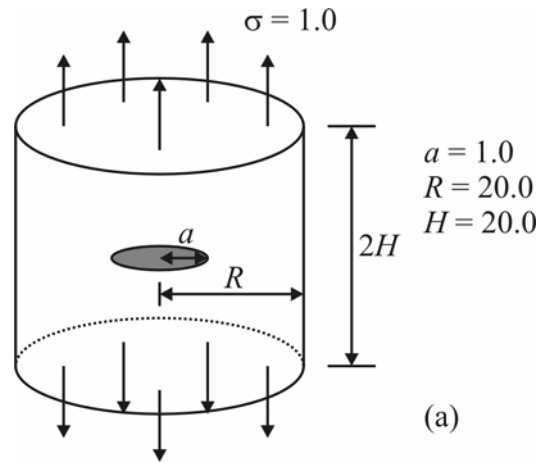


Figure 70. Interaction between crack front perturbations.



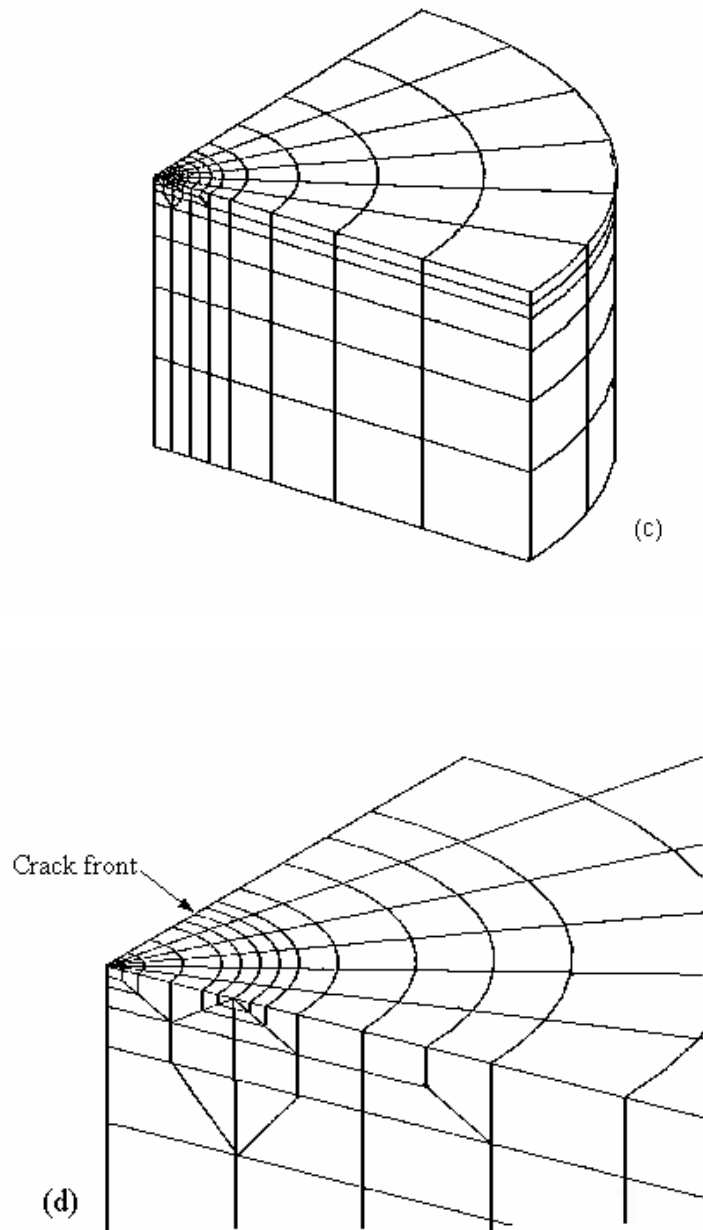


Figure 71. (a) Embedded penny-shaped crack in a large cylinder subjected to uniform remote tensile loading, Example 5. (b) Nodes around crack front. (c) Mesh configuration. (d) Detail of mesh around crack front.

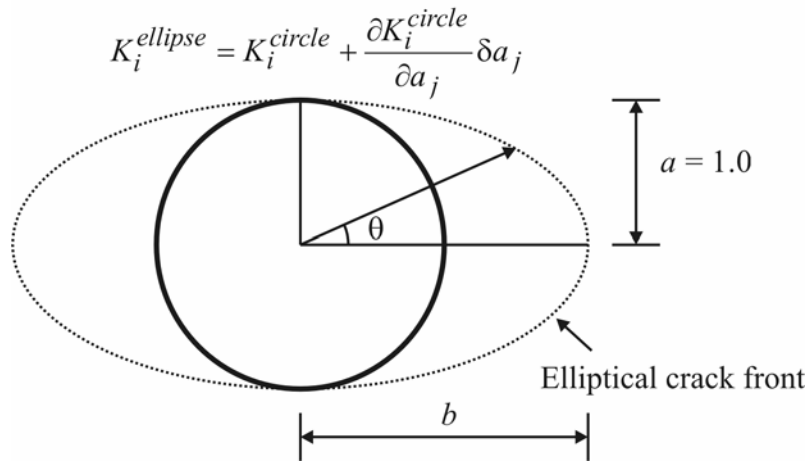


Figure 72. Approximation of stress intensity factor around an elliptical crack front based on known values of stress intensity factor and its derivative for a penny-shaped crack front, Example 5.

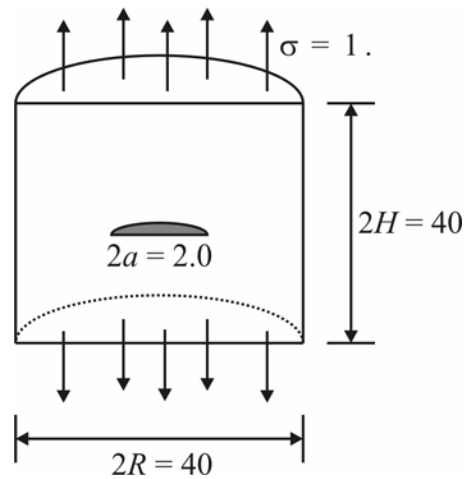


Figure 73. Half-penny-shaped surface crack under uniform remote tensile loading, Example 6.

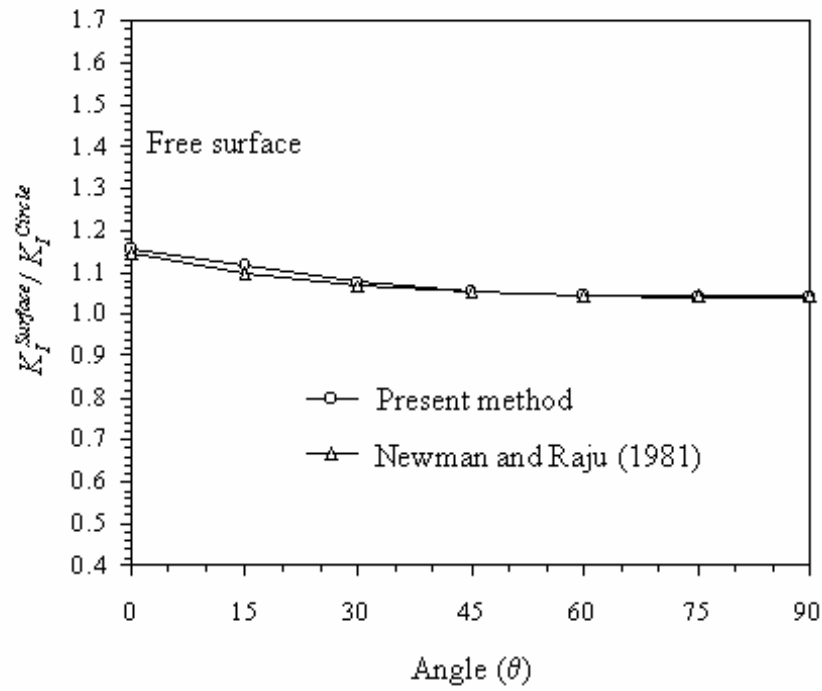


Figure 74. Comparison of the predicted values of stress intensity factor with reference solution, where $K_I^{\text{circle}} = 2\sigma \sqrt{a/\pi}$, Example 6.

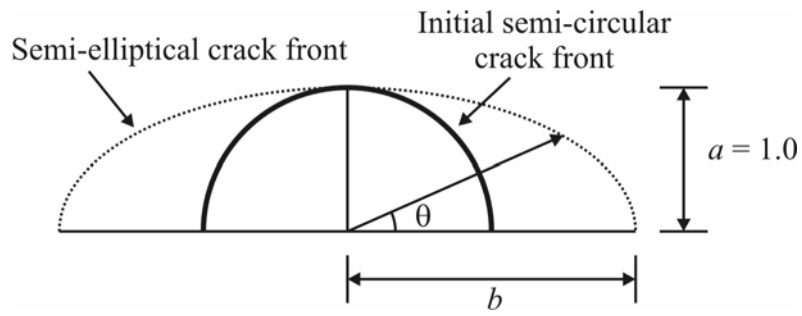
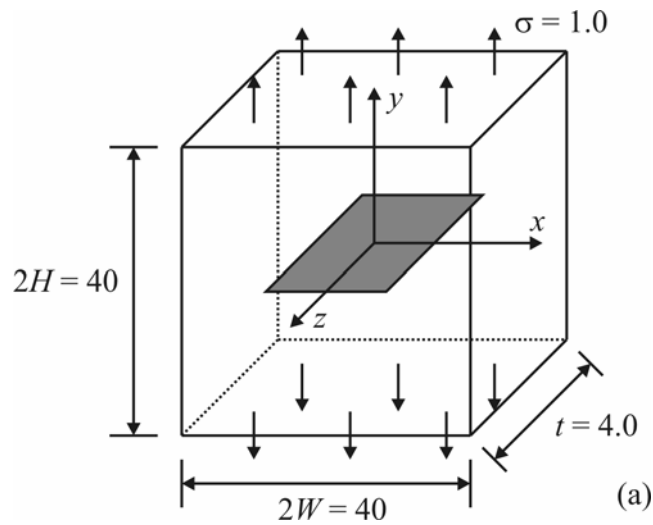
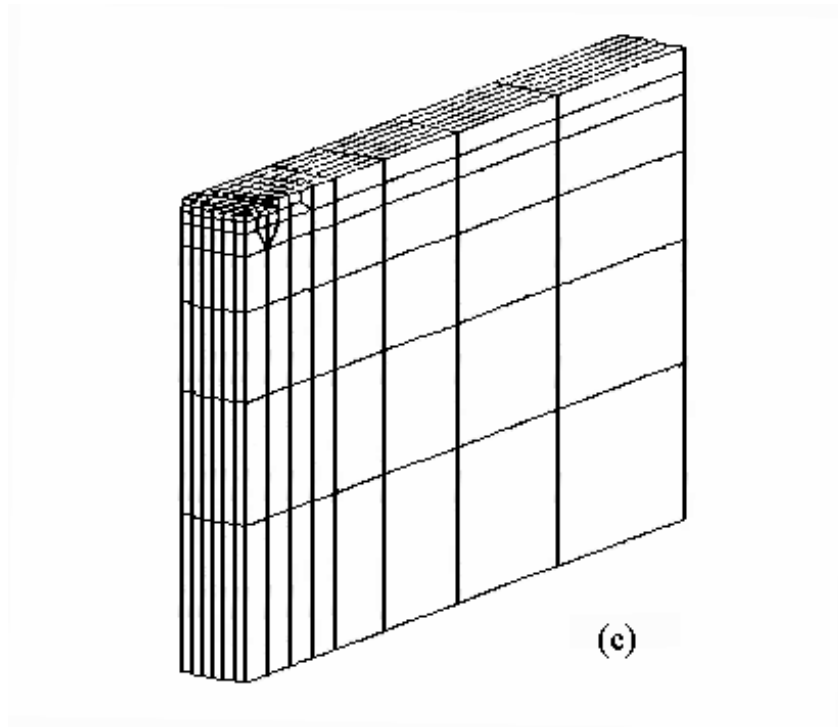
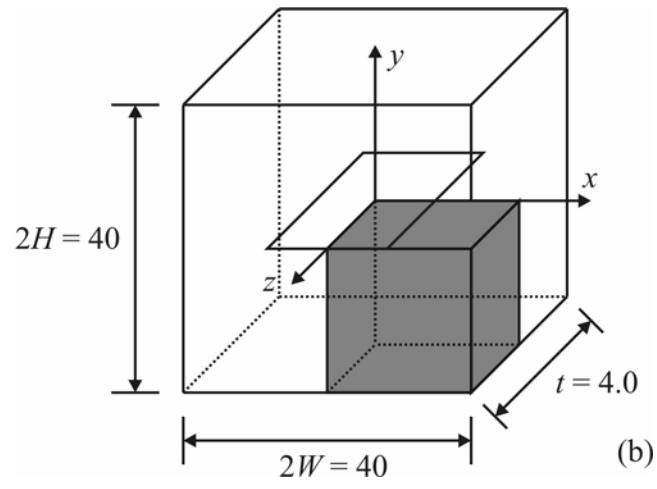


Figure 75. Approximation of stress intensity factor around a semi-elliptical crack front based on known values of stress intensity factor and its derivative for a semi-circular crack front, Example 6.





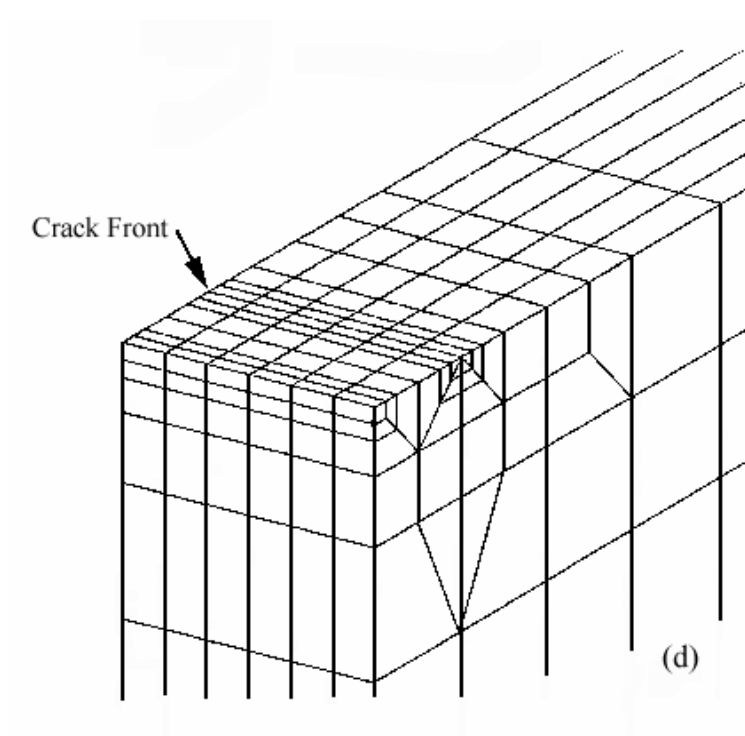
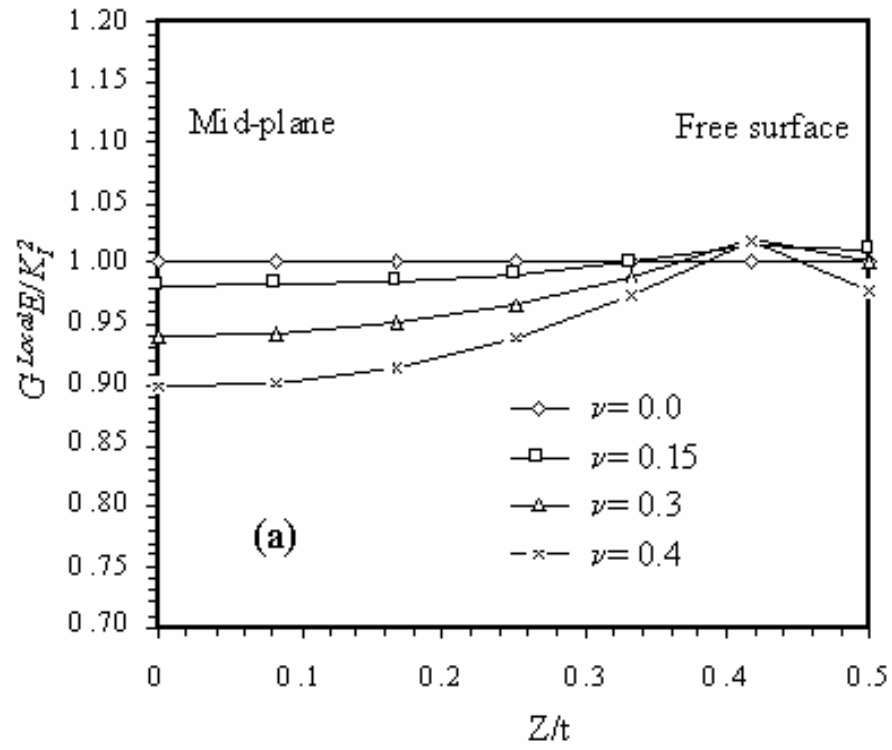


Figure 76. (a) Center-cracked plate under remote tensile loading, Example 7. (b) Octant of problem (shaded) for finite element analysis. (c) Mesh. (d) Detail of mesh around crack front.



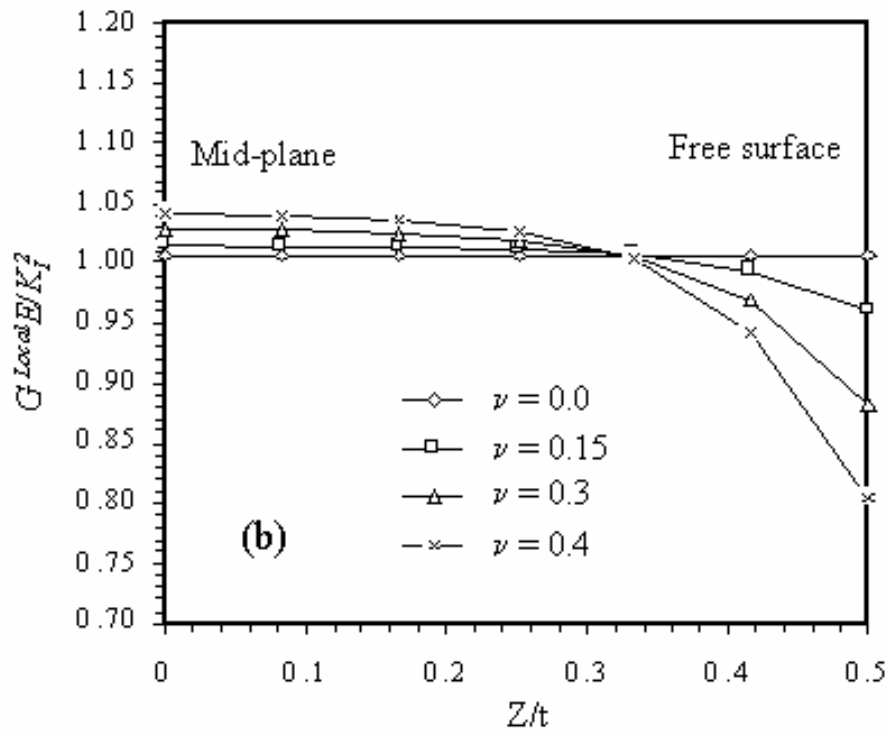


Figure 77. (a) Normalized local energy release rate along the half-crack front for various Poisson ratios with $a = 1.0$, $W=H=20.0$, and $t = 4.0$, Example 7. (b) Normalized local energy release rate along the half-crack front for various Poisson ratios with $a = 8.0$, $W=H=20.0$, and $t = 4.0$.