Crack Between Neo-Hookean Material and Rigid Body - Pre-Analysis & Start-up

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Pre-Analysis & Start-Up

The linear elastic crack solutions for the stress near the crack tip are:

$$\sigma_r = \frac{K_I}{\sqrt{2\pi r}}\left(\frac{5}{4}\cos\frac{\theta}{2} - \frac{1}{4}\cos\frac{3\theta}{2}\right);$$

$$\sigma_\theta = \frac{K_I}{\sqrt{2\pi r}}\left(\frac{3}{4}\cos\frac{\theta}{2} + \frac{1}{4}\cos\frac{3\theta}{2}\right);$$

$$\tau_{r\theta} = \frac{K_I}{\sqrt{2\pi r}}\left(\frac{1}{4}\sin\frac{\theta}{2} + \frac{1}{4}\sin\frac{3\theta}{2}\right)$$

Thee linear elastic crack solutions for the displacement near the crack tip are:

$$u_r = \frac{K_I}{4\mu}\sqrt{\frac{r}{2\pi}}\left[(2\kappa - 1)\cos\frac{\theta}{2} - \cos\frac{3\theta}{2}\right];$$

$$u_\theta = \frac{K_I}{4\mu}\sqrt{\frac{r}{2\pi}}\left[-(2\kappa + 1)\sin\frac{\theta}{2} + \sin\frac{3\theta}{2}\right]$$

where r is the radial direction and theta is the circumferential direction. The value for both mu and K is 1e6.

Start-Up

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