Corrections to

Fracture Mechanics

Lecture Notes in Applied and Computational Mechanics, 62

Last updated March 14, 2016

Over the years I have found a number of small mistakes in my book. I hope they've not caused you any trouble. In any case, here are some corrections. There are probably other mistakes I've yet to catch. If so, let me know.

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Section 2.4

p. 9

Equation (2.4) should read

$$w(x_1, x_2) = w^*(x_1, x_2)$$

p. 11

Just after equation 2.17 it should read ... Eqns (2.16) and (2.17) predict that the stress field is singular ...

p. 12

For consistency with Eq (2.16), on this whole page B_2 should be replaced by B_1 .

p. 14

On the 2nd line it should read ... is given by $f' = u,_1 + iv,_1 = \ldots$

Section 5.3

p. 68

Equation 4.16 should be

$$\theta_0 = \lambda'(l) - \frac{\eta}{\sqrt{\pi}} \int_0^l \frac{\lambda'(x)}{(l-x)^{/2}} dx \ ,$$

Section 5.3

p. 82

Here I neglected to account for the fact that A_n in Eq. (5.7) can be complex. So let $A_n = B_n + iC_n$. Then the complex stress is written as

$$\tau = \sum_{n=-\infty}^{+\infty} A_n z^{\lambda_n} = \sum_{n=-\infty}^{+\infty} (B_n + iC_n) r^{\lambda_n} (\cos \lambda_n \theta + i \sin \lambda_n \theta)$$

Set the traction to zero on the crack faces, i.e. $\mathrm{Re}(\tau(\theta = \pm\pi)) = 0$ to get the two equations:

$$\begin{aligned} \sum r^{\lambda_n}(B_n \cos \lambda_n \pi + iC_n \sin \lambda_n \pi) &= 0 \\ \sum r^{\lambda_n}(B_n \cos \lambda_n \pi - iC_n \sin \lambda_n \pi) &= 0 \ . \end{aligned}$$

Add and subtract the above equations to get two sets of eigenvalues and eigenfunctions:

$$\begin{aligned} \lambda_n = -\frac{1}{2} + n \quad &, \quad C_n = 0 \\ \lambda_n = n \quad &, \quad B_n = 0 \end{aligned}$$

As discussed in the book, taking only $\lambda_n \geq -\frac{1}{2}$ we have the Laurent series for the complex stress for a sharp anti-plane shear crack as

$$\tau = \sum_{n=0}^{\infty} B_n z^{-\frac{1}{2}+n} + iC_n z^n \quad .$$

In this case the leading coefficient is related to the stress intensity factor by

$$B_0 = \frac{K_{III}}{\sqrt{2\pi}}$$

The boundary collocation procedure, Eq. (5.8), should read

$$\mathrm{Im} \sum_{n=0}^{p} (B_n z^{-\frac{1}{2}+n} + iC_n z^n) n^k = t_3^k \ .$$

If you work through the assignment on this topic you may find some interesting results regarding the coefficients B_n and C_n. Try it out!

Sec. 5.6

p. 105

In Eqn (5.38) replace σ_a by τ_a.

Sec. 6.3

p. 115

Replace MTB with MBT.

V_L should be v_l.

V_{LC} should be v_{LC}. v_{LC} is defined as the load-line displacement at fracture.