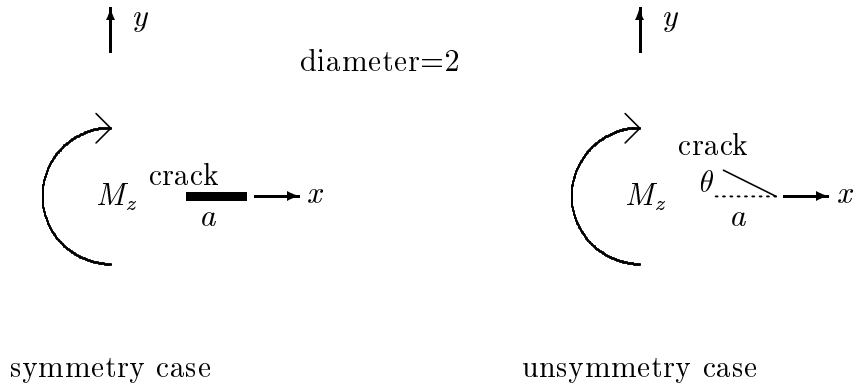


邊界元素法第八次作業



1. By discretizing the circular boundary with 8 elements, four elements on crack boundary with crack length $a = 1.0$ (two on the upper crack line, the other two on the lower crack line), determine the influence coefficients for the four matrices of U_{ij} , \bar{T}_{ij} , \bar{L}_{ij} and M_{ij} using BEPO2D program developed by MSV Lab. in NTOU.

2. Please check $[\bar{T}]$ and $[M]$ matrices by constant potential (rigid body mode) and $[U]^{-1}[\bar{T}]$ and $[\bar{L}]^{-1}[M]$ by equilibrium condition. Is there any problem? Why?

3. For the Laplace problem with $G.E.$: $\nabla^2 u(x_1, x_2) = 0, (x_1, x_2) \in D$

Substituting the boundary conditions of Dirichlet type as follows: $BC: u(x_1, x_2) = \frac{(x_1^2 + x_2^2)}{2}$, (x_1, x_2) on the boundary of circle and crack into BEPO2D program, find the unknowns t on boundary and the u values in the interior.

4. Comparing the dual BEM solution with the exact solution (Set $0 < r < 1, \phi = \pi$)

$$u(r, \phi) = 32 \frac{a^2}{\pi} \sum_{n=0}^{\infty} \frac{\left(\frac{r}{a}\right)^{(2n+1)/2} - \left(\frac{r}{a}\right)^2}{(2n+1)[16 - (2n+1)^2]} \sin \frac{(2n+1)\phi}{2} + \frac{r^2}{2}$$

5. Plot the contour for u value in the domain using the exact solution and dual BEM solutions.

References

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- [2] J. T. Chen, K. H. Chen, W. Yeh and N. C. Shieh, 1998, Dual Boundary Element Analysis for Cracked Bars under Torsion, Engineering Computations, Accepted. (SCI and EI, Impact factor 1.1)