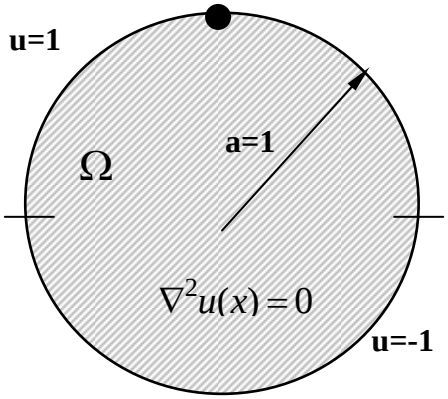
班級：_____ 學號：_____ 姓名：_____

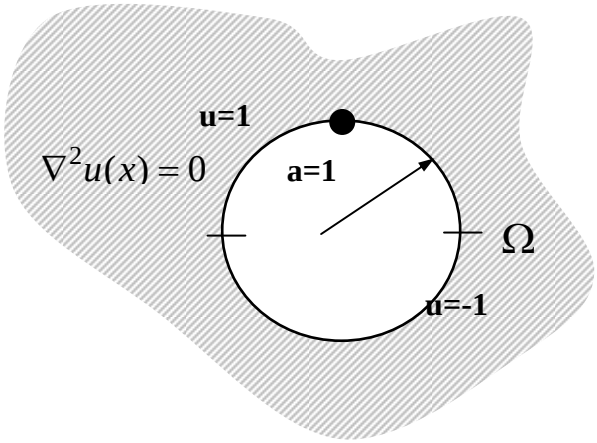
國立台灣海洋大學河海工程研究所 BEM2004 第 13 次作業

Problem statement and solution



Exact solution: $\frac{2}{\pi}\tan^{-1}(\frac{-2y}{1-x^2-y^2})$

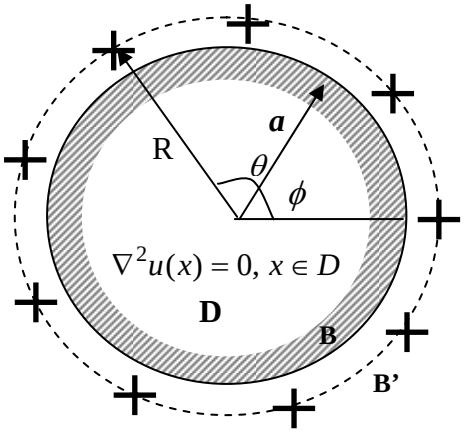
Interior problem



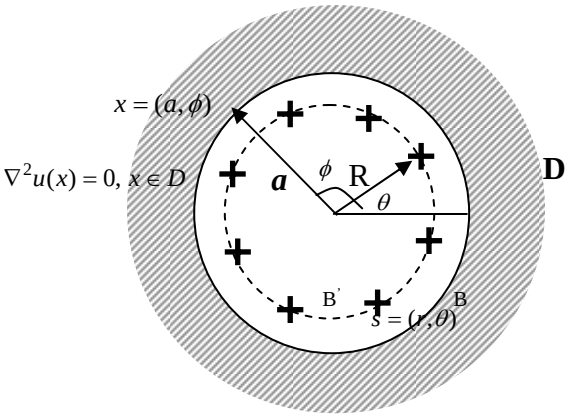
Exact solution: $\frac{2}{\pi}\tan^{-1}(\frac{2y}{x^2+y^2-1})$

Exterior problem

Distribution of source point for the indirect method(MFS)

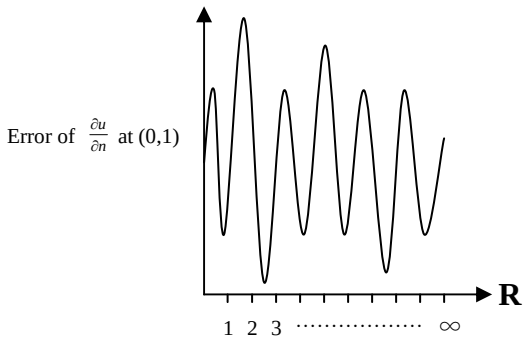


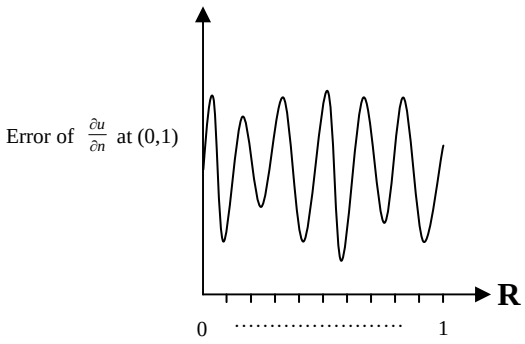
＋: distribution of source point



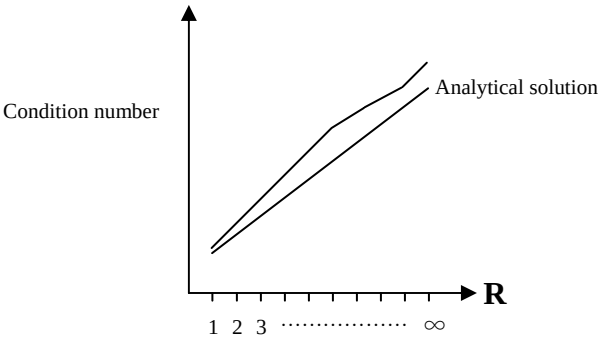
＋: distribution of source point

Error plot by using indirect method (21 source are distributed)

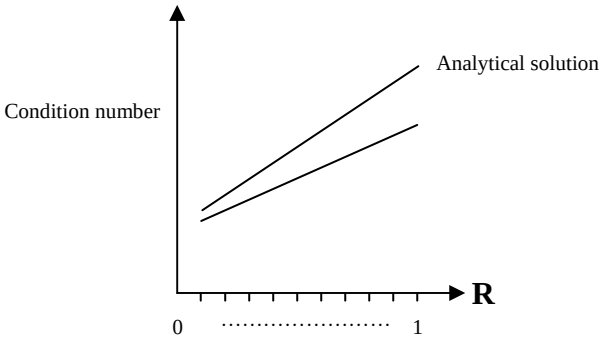




Plot condition number for 21 points



Interior case



Exterior case

Calculate the errors of *t* of Trefftz method and MFS

	Error of *t* (percent)
Trefftz method (21 bases)	
MFS (21 points)	

Trefftz method：

$$u(x) = \sum_{j=1}^{N_T} a_j T_j(x)$$

where N_T is the number of complete functions.

For the interior problem, we choose $T = \{1, \rho^n \cos(n\phi), \rho^n \sin(n\phi)\}, \quad n = 1, 2, 3, \cdots$

For the exterior problem, we choose $T = \{\ln \rho, \rho^{-n} \cos(n\phi), \rho^{-n} \sin(n\phi)\}, \quad n = 1, 2, 3, \cdots$

MFS：

$$u(x) = \sum_{j=1}^{N_F} b_j U(x, s_j)$$

where $U(x, s) = \ln \left| \underset{\sim}{x} - \underset{\sim}{s} \right|$, N_F is the number of sources.