系所：_____班級：_____學號：_____姓名：_____

國立台灣海洋大學河海工程研究所 BEM2004 第 11 次作業

1. Please plot the degenerate kernel of the closed-form fundamental solution.

Closed-form：

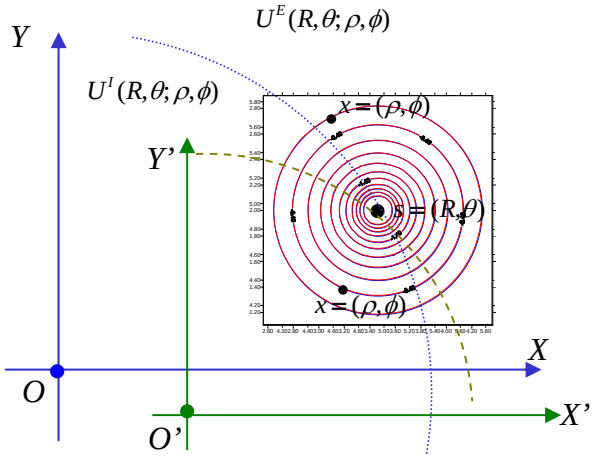
$$U(s,x)=r^2\ln r\,,\quad r=|x-s|$$

Degenerate form：

$$U(s,x)=\begin{cases} U^I(s,x)=\rho^2(1+\ln R)+R^2\ln R-R\rho(1+2\ln R)\cos(\theta-\phi) \\ \qquad -\sum_{m=1}^{\infty}\dfrac{1}{m(m+1)}\dfrac{\rho^{m+2}}{R^m}\cos[m(\theta-\phi)]+\sum_{m=2}^{\infty}\dfrac{1}{m(m-1)}\dfrac{\rho^m}{R^{m-2}}\cos[m(\theta-\phi)]\,,\ R>\rho \\ U^E(s,x)=R^2(1+\ln\rho)+\rho^2\ln\rho-\rho R(1+2\ln\rho)\cos(\theta-\phi) \\ \qquad -\sum_{m=1}^{\infty}\dfrac{1}{m(m+1)}\dfrac{R^{m+2}}{\rho^m}\cos[m(\theta-\phi)]+\sum_{m=2}^{\infty}\dfrac{1}{m(m-1)}\dfrac{R^m}{\rho^{m-2}}\cos[m(\theta-\phi)]\,,\ \rho>R \end{cases}$$

where $x=(\rho,\phi)$ and $s=(R,\theta)$.

The origin of the observer coordinate system depends on you.



Polar coordinate $x=(\rho,\phi)$ and $s=(R,\theta)$.