

國立台灣海洋大學河海工程研究所 BEM2004 第 10 次作業

1. In the course, we have derived the Poisson integral formulæ for the interior problem

Closed-form

$$u(\rho, \phi) = \frac{1}{2\pi} \int_0^{2\pi} \frac{a^2 - \rho^2}{[a^2 + \rho^2 - 2a\rho \cos(\theta - \phi)]} f(\theta) d\theta, \quad 0 < \rho < a, \quad 0 < \phi < 2\pi$$

Series-form

$$u(\rho, \phi) = \frac{1}{2\pi} \int_0^{2\pi} [1 + 2 \sum_{m=1}^{\infty} (\frac{\rho}{a})^m \cos(m(\phi - \theta))] f(\theta) d\theta, \quad 0 < \rho < a, \quad 0 < \phi < 2\pi$$

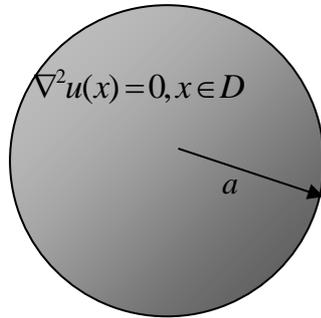
Please extend to exterior case,

Closed-form

$$u(\rho, \phi) = \frac{1}{2\pi} \int_0^{2\pi} \frac{\rho^2 - a^2}{[a^2 + \rho^2 - 2a\rho \cos(\phi - \theta)]} f(\theta) d\theta, \quad 0 < \rho < \infty, \quad 0 < \phi < 2\pi$$

Series-form

$$u(\rho, \phi) = \frac{-1}{2\pi} \int_0^{2\pi} [1 + 2 \sum_{m=1}^{\infty} (\frac{a}{\rho})^m \cos(m(\phi - \theta))] f(\theta) d\theta, \quad a < \rho < \infty, \quad 0 < \phi < 2\pi$$



$$u(x)|_{x=B} = f(\theta)$$

