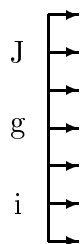


程式17 Exterior problem



(a). scattering

$$u(R, \theta) = \begin{cases} 1 & , -\alpha < \theta < \alpha \\ 0 & , otherwise \end{cases}$$

$$(\nabla^2 + k^2)u(r, \theta) = 0$$

(b). radiation

Governing equation:

$$(\nabla^2 + k^2)u(r, \theta) = 0$$

Boundary conditions for radiation problem:

$$u(R, \theta) = \begin{cases} 1 & , -\alpha < \theta < \alpha \\ 0 & , otherwise \end{cases}$$

Analytical solution: Radiation problem:

$$u(r, \theta) = \frac{2}{\pi} \sum_{n=0}^{\infty} i^n \frac{\sin n\alpha}{n} \frac{H_n^{(1)}(kr)}{H_n^{(1)}(ka)} \cos n\theta$$

Analytical solution: Scattering problem:

$$u(r, \theta) = -2 \sum_{n=0}^{\infty} i^n \frac{J_n(ka)}{H_n^{(1)}(ka)} H_n^{(1)}(kr) \cos n\theta$$

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