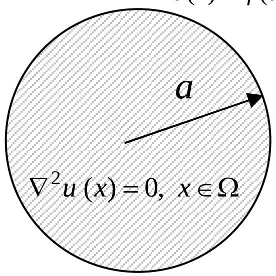
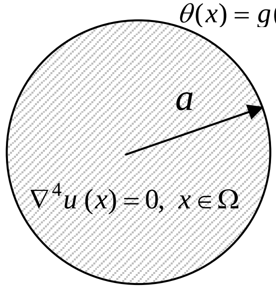
程式 87 Degenerate kernel for Green’s function of plate problems

	Past	Current
Problem statement	$u(x)=f(\theta),\ \ x\in B$  a $\nabla^2 u(x)=0,\ \ x\in\Omega$	$u(x)=f(\theta)$ $\theta(x)=g(\theta),\ \ x\in B$  a $\nabla^4 u(x)=0,\ \ x\in\Omega$
Green’s function	G. E.: $\nabla^2 G(x,\xi)=\delta(x-\xi)$ B. C.: $G(x,\xi)\vert_{x\in B}=0$	G. E.: $\nabla^4 G(x,\xi)=\delta(x-\xi)$ B. C.: $G(x,\xi)\vert_{x\in B}=0$ $\frac{\partial G(x,s)}{\partial n_x}\vert_{x\in B}=0$
Degenerate kernel	$U(x,s)=\ln(r)=\begin{cases} U^I(x,s)=\ln R-\sum_{m=1}^{\infty}\frac{1}{m}(\frac{\rho}{R})^m\cos[m(\theta-\phi)], & \rho<R, \\ U^E(x,s)=\ln\rho-\sum_{m=1}^{\infty}\frac{1}{m}(\frac{R}{\rho})^m\cos[m(\theta-\phi)], & \rho>R, \end{cases}$	$U(\rho,\phi;R,\theta)=r^2\ln r$ $=\begin{cases} U^I(x,s)=\rho^2(1+\ln R)+R^2\ln R-2\rho R\ln R\cos\theta\cos\phi-2\rho R\ln R\sin\theta\sin\phi-\rho R\cos\theta\cos\phi-\rho R\sin\theta\sin\phi-\frac{1}{2}\frac{\rho^3}{R}\cos\theta\cos\phi-\frac{1}{2}\frac{\rho^3}{R}\sin\theta\sin\phi \\ -\sum_{m=2}^{\infty}\frac{\rho^m}{R^{m-2}}[\frac{\rho^2}{m(m+1)R^2}-\frac{1}{m(m-1)}]\cos m\theta\cos m\phi-\sum_{m=2}^{\infty}\frac{\rho^m}{R^{m-2}}[\frac{\rho^2}{m(m+1)R^2}-\frac{1}{m(m-1)}]\sin m\theta\sin m\phi, \quad R>\rho \\ U^E(x,s)=R^2(1+\ln\rho)+\rho^2\ln\rho-2\rho R\ln\rho\cos\theta\cos\phi-2\rho R\ln\rho\sin\theta\sin\phi-\rho R\cos\theta\cos\phi-\rho R\sin\theta\sin\phi-\frac{1}{2}\frac{R^3}{\rho}\cos\theta\cos\phi-\frac{1}{2}\frac{R^3}{\rho}\sin\theta\sin\phi \\ -\sum_{m=2}^{\infty}\frac{R^m}{\rho^{m-2}}[\frac{R^2}{m(m+1)R^2}-\frac{1}{m(m-1)}]\cos m\theta\cos m\phi-\sum_{m=2}^{\infty}\frac{R^m}{\rho^{m-2}}[\frac{R^2}{m(m+1)R^2}-\frac{1}{m(m-1)}]\sin m\theta\sin m\phi, \quad \rho>R \end{cases}$

References: (1) Mills R. D., 1977, Computing internal viscous flow problems for the circle by integral methods, J. Fluid Mech., Vol.12, pp.609-624.

(2) Yiorgos-Sokratis, Smyrlis & Andreas Karageorphis, 2003, Some aspects of the method of fundamental solutions for certain biharmonic problems, CMES, Vol. 4, No. 5, pp. 535-550.