程式 78　Free terms for plate (Dynamics)

According to the references [1], we obtain some properties of the free term for Laplace problem.

In 2-D and 3-D Laplace problems, we have

Kernel	$U(s,x)$	$T(s,x)$	$L(s,x)$	$M(s,x)$
Singularity (2-D)	$O(\ln(r))$	$O(1/r)$	$O(1/r)$	$O(1/r^2)$
Singularity (3-D)	$O(1/r)$	$O(1/r^2)$	$O(1/r^2)$	$O(1/r^3)$
Free term (2-D)	No jump	$p\ u$	$-\frac{1}{2}p\ t$	$\frac{1}{2}p\ t$
Free term (3-D)	No jump	$2p\ u$	$-\frac{2}{3}p\ t$	$\frac{4}{3}p\ t$
Principal value	R.P.V.	C.P.V.	C.P.V.	H.P.V.

where $U(s,x)=\ln r$ (2D), $U(s,x)=1/r$ (3D).

This problem can be extended to 2-D biharmonic problem (plate),

Kernel	$U(s,x)$	$\Theta(s,x)$	$M(s,x)$	$V(s,x)$
Singularity				
Free term				
Principal value				
Kernel	$U_q(s,x)$	$\Theta_q(s,x)$	$M_q(s,x)$	$V_q(s,x)$
Singularity				
Free term				
Principal value				
Kernel	$U_m(s,x)$	$\Theta_m(s,x)$	$M_m(s,x)$	$V_m(s,x)$
Singularity				
Free term				
Principal value				
Kernel	$U_v(s,x)$	$\Theta_v(s,x)$	$M_v(s,x)$	$V_v(s,x)$
Singularity				
Free term				
Principal value				

where $U(s,x)=\frac{i}{8l^2}\{H_0^{(2)}(lr)+H_0^{(1)}(ilr)\}$

Reference

[1] J. T. Chen, S. R. Kuo, W. C. Chen and L. W. Liu, On the free terms of the dual BEM for the two and three-dimensional Laplace problems, Journal of Marine Science and Technology, Vol.8, No.1, pp.8-15, 2000.