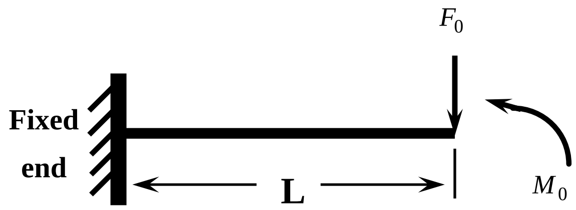
程式 105　Solution for the cantilever beam using indirect BEM



Governing equation:

$$\frac{d^4u(x)}{dx^4}=0,\ 0<x<L$$

Boundary conditions:

$u(0)=0,\ \theta(0)=0$

$m(L)=M_0,\ v(L)=F_0$

Direct method

$$u(x)=\{-U(s,x)v(s)+\Theta(s,x)m(s)-M(s,x)\theta(s)+V(s,x)u(s)\}\big|_{s=0}^{s=1}$$

Indirect method

Based on the indirect formulation, the displacement field can be represented by

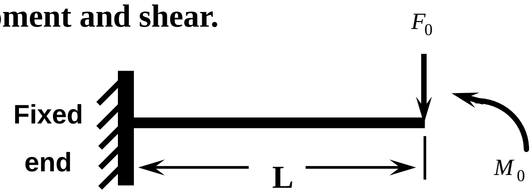
$$u(x)=\sum_{j=1}^{2}P(s_j,x)\phi_j+\sum_{j=1}^{2}Q(s_j,x)\psi_j\ .$$

The two kernels P and Q are obtained from either the two combinations of the kernels $U(s,x)$, $\Theta(s,x)$, $M(s,x)$ and $V(s,x)$.

Choosing P and Q	Group
U,Θ	吳安傑、錢榮芳、李文愷、周家慶
U,M	陳柏源、袁倫欽、莊士璿
U,V	高政宏、陳永為、黃家鴻
Θ,M	洪啟哲、王錦楨、吳尚津
Θ,V	張文夏、何易霖、張致文
M,V	楊秉璋、潘志鴻、陳柏帆

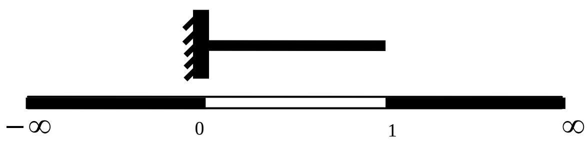
(1) Solve the cantilever case subject to the end moment and shear.

(2) Solve the problem by the indirect BEM.



(3) Detect the rank of [A] matrix where

$$\begin{bmatrix} & & \\ & A & \\ & & \end{bmatrix}\begin{Bmatrix}\phi_1\\ \phi_2\\ \psi_1\\ \psi_2\end{Bmatrix}=\begin{Bmatrix}0\\0\\F_0\\M_0\end{Bmatrix}.$$



$$\begin{bmatrix} & & \\ & A & \\ & & \end{bmatrix}\begin{Bmatrix}\phi_1\\ \phi_2\\ \psi_1\\ \psi_2\end{Bmatrix}=\begin{Bmatrix}0\\0\\F_0\\M_0\end{Bmatrix}$$