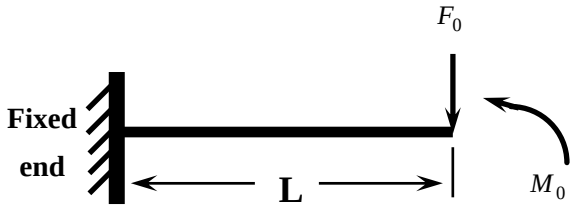
班級：_____學號：_____姓名：_____

# 海洋大學河海工程研究所 BEM2004 第 8 次作業討論會 Nov. 24/04




**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**

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

**Indirect method**

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

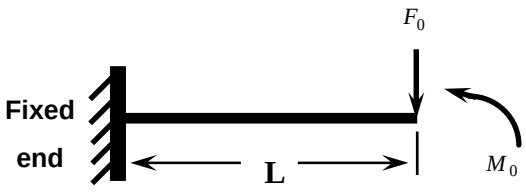
$$u(x) = \sum_{j=1}^{2} P(s_j, x)\phi_j + \sum_{j=1}^{2} Q(s_j, x)\psi_j \ .$$

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** |
|---|---|
| **14:10-14:25 $U$, $\Theta$** | 吳安傑、錢榮芳、李文愷、周家慶 |
| **14:25-14:40 $U$, $M$** | 陳柏源、袁倫欽、莊士璿 |
| **14:40-14:55 $U$, $V$** | 高政宏、陳永為、黃家鴻 |
| **14:55-15:10 $\Theta$, $M$** | 洪啟哲、王錦楨、吳尚津 |
| **15:10-15:25 $\Theta$, $V$** | 張文夏、何易霖、張致文 |
| **15:25-15:40 $M$, $V$** | 楊秉璋、潘志鴻、陳柏帆 |

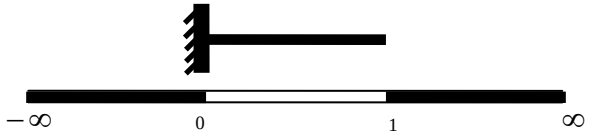
**(1) Solve the exact solution of cantilever case subject to the end moment and shear.**

**(2) Solve the problem by the indirect BEM.**




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

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




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

**Note: prepare the powerpoint file**

**Discuss the different distributions of singularity**