

邊界元素法1998 第十六次作業

1. Four eigenequations are available for the eigenproblems by using dual equations, please solve the eigenproblem by least square method.

Case 1. $u(0) = u(1) = 0$

$$\begin{bmatrix} 0 & \frac{-1}{2} \left(\frac{\sin \sqrt{\lambda}}{\sqrt{\lambda}} \right) \\ \frac{1}{2} \left(\frac{\sin \sqrt{\lambda}}{\sqrt{\lambda}} \right) & 0 \\ \cdots & \cdots \\ \frac{1}{2} & -\frac{1}{2} \cos \sqrt{\lambda} \\ -\frac{1}{2} \cos \sqrt{\lambda} & \frac{1}{2} \end{bmatrix} \begin{Bmatrix} t(0) \\ t(1) \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix} \quad (1)$$

Case 2. $t(0) = t(1) = 0$

$$\begin{bmatrix} \frac{1}{2} & \frac{-1}{2} \cos \sqrt{\lambda} \\ \frac{-1}{2} \cos \sqrt{\lambda} & \frac{1}{2} \\ \cdots & \cdots \\ 0 & -\frac{1}{2} \sqrt{\lambda} \sin \sqrt{\lambda} \\ \frac{1}{2} \sqrt{\lambda} \sin \sqrt{\lambda} & 0 \end{bmatrix} \begin{Bmatrix} u(0) \\ u(1) \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix} \quad (2)$$

Case 3. $u(0) = t(1) = 0$

$$\begin{bmatrix} 0 & \frac{1}{2} \cos \sqrt{\lambda} \\ \frac{1}{2} \frac{\sin \sqrt{\lambda}}{\sqrt{\lambda}} & \frac{-1}{2} \\ \cdots & \cdots \\ -\frac{1}{2} & \frac{1}{2} \sqrt{\lambda} \sin \sqrt{\lambda} \\ \frac{1}{2} \cos \sqrt{\lambda} & 0 \end{bmatrix} \begin{Bmatrix} t(0) \\ u(1) \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix} \quad (3)$$

References

- [1] J. T. Chen and F. C. Wong, 1997, Analytical Derivations for One-dimensional Eigenproblems Using Dual BEM and MRM, Engineering Analysis with Boundary Elements, Vol.20, No.1, p.25-33. (SCI and EI, Impact factor 0.358)