

HOMEWORK 5

Due date: April 16, 2020, 11:55PM.

Bibliography: Trefethen & Bau, Lectures 24-31

1. Use the Schur decomposition to prove:

Theorem. *Abel's Formula.* If $\mathbf{A}(t)$ is continuous on (a, b) , and $\mathbf{Y} = (\mathbf{y}_1 \dots \mathbf{y}_n)$ is a matrix whose columns are solutions of $\mathbf{y}' = \mathbf{A}\mathbf{y}$ on (a, b) , then the Wronskian $W(t) = |\mathbf{Y}|$ is given by

$$W(t) = \exp\left[\int_{t_0}^t \text{tr } \mathbf{A}(s) \, ds\right] W(t_0).$$

2. Ex. 27.3, 27.5, pp. 209-210.

3. Ex 29.1, pp. 223-224

4. Ex 30.4, p. 233

5. Apply the code from Ex.3 to find elastic vibrational modes (eigenvalues and eigenvectors) of the L-shaped plate shown in the figure. The system matrix is generated from the FreeFEM code derived in class.

