2.3.4 N even

w real and asymmetric $w = \begin{bmatrix} w_1 \\ -Jw_1 \end{bmatrix}$ w_1 real and contains first $\frac{N}{2}$ elements of w

v(e) conjugate symmetric $v(e) = \begin{bmatrix} v_1(e) \\ Jv_1^*(e) \end{bmatrix}$

$$B_e(e) = w^{\#} v(e) = \begin{bmatrix} w_1^T & -w_1^T J^T \end{bmatrix} \begin{bmatrix} v_1(e) \\ Jv_1^*(e) \end{bmatrix}$$

$$= w_1^T v_1(e) - w_1^T \underbrace{J^T J}_{I} v_1^*(e) = w_1^T v_1(e) - w_1^T v_1^*(e)$$

$$= w_1^T \{ v_1(e) - v_1^*(e) \}$$

$$B_e(e) = w_1^T 2j \, \mathrm{Im}\{v_1(e)\} = j \left[2 w_1^T \mathrm{Im}\{v_1(e)\} \right] \Rightarrow \text{purely imaginary}$$