Project III: (ENE 610)

① $x = b^T C(\omega) c^T(\omega) b$

$b = [b[0] \quad b[1] \quad \dots \quad b[N-1/2]]^T$ Type I

$c(\omega) = [1 \quad \cos\omega \quad \dots \quad \cos(\frac{1}{2}(N-1)\omega)]^T$

② $\Phi \equiv \text{MATRIX} = \int_P W_p(\omega)\, C(\omega)\, C^T(\omega)\, d\omega$ } SYMMETRIC

$R \equiv \text{MATRIX} = \int_S W_s(\omega)\, C(\omega)\, C^T(\omega)\, d\omega$ }

$d \equiv \text{vector} = \int_P W_p(\omega)\, D(\omega)\, C(\omega)\, d\omega$

③ Type ③ & ④ filters $M(\omega) = b^T S(\omega)$ [Eq. 2 in project]

$b = \begin{cases} [b[1] \quad b[2] \quad \dots \quad b[\frac{N-1}{2}]]^T & \text{Type 3} \\ [b[1] \quad b[2] \quad \dots \quad b[N/2]]^T & \text{Type 4} \end{cases}$

$S(\omega) = \begin{cases} [\sin\omega \quad \sin 2\omega \quad \dots \quad \sin(\frac{1}{2}(N-1)\omega)]^T & \text{Type III} \\ [\sin\frac{\omega}{2} \quad \sin\frac{3\omega}{2} \quad \dots \quad \sin(\frac{1}{2}(N-1)\omega)]^T & \text{Type IV} \end{cases}$

$[\alpha\Theta_1 + \beta R_1]\, b = \alpha d_1$ } like $[\alpha\Theta + \beta R]\, b = \alpha d$

this matrix vector equation is also symmetric, positive definite.

$\Theta_1 = \int_P W_p(\omega)\, S(\omega)\, S^T(\omega)\, d\omega$

$R_1 = \int_S W_s(\omega)\, S(\omega)\, S^T(\omega)\, d\omega$

$d_1 = \int_P W_p(\omega)\, D(\omega)\, S(\omega)\, d\omega$