data:

$$egin{aligned} oldsymbol{S_k^{gl}}, oldsymbol{S_k^{gu}} & \forall k \in G \ oldsymbol{c}_{2k}, oldsymbol{c}_{1k}, oldsymbol{c}_{0k} & \forall k \in G \ oldsymbol{v_i^l}, oldsymbol{v_i^u} & \forall i \in N \end{aligned}$$

$$S_i^d, Y_i^s \ \forall i \in N$$

$$Y_{ij}, b_{ij}^c, T_{ij} \ \forall (i,j) \in E$$

$$s_{ij}^{\boldsymbol{u}}, \boldsymbol{\theta}_{ij}^{\boldsymbol{\Delta l}}, \boldsymbol{\theta}_{ij}^{\boldsymbol{\Delta u}} \ \forall (i,j) \in E$$

variables:

$$S_k^g \ \forall k \in G$$

$$V_i \ \forall i \in N$$

$$S_{ij} \ \forall (i,j) \in E \cup E^R$$

minimize: $\sum c_{2k}(\Re(S_k^g))^2 + c_{1k}\Re(S_k^g) + c_{0k}$

$$\sum_{k \in G} c_{2k} (\Re(S_k^g))^2 + c_{1k} \Re(S_k^g) + c_{0k}$$

subject to:

$$S_k^{gl} \le S_k^g \le S_k^{gu} \ \forall k \in G$$

$$v_i^l \le |V_i| \le v_i^u \ \forall i \in N$$

$$\sum_{k \in G_i} S_k^g - S_i^d - Y_i^s |V_i|^2 = \sum_{(i,j) \in E_i \cup E_i^R} S_{ij} \quad \forall i \in \mathbb{N}$$

$$(4)$$

$$S_{ij} = \left(\boldsymbol{Y}_{ij}^* - \boldsymbol{i}\frac{\boldsymbol{b}_{ij}^c}{2}\right) \frac{|V_i|^2}{|\boldsymbol{T}_{ij}|^2} - \boldsymbol{Y}_{ij}^* \frac{V_i V_j^*}{\boldsymbol{T}_{ij}} \quad \forall (i,j) \in E$$
 (5)

$$S_{ji} = \left(\boldsymbol{Y}_{ij}^* - \boldsymbol{i}\frac{\boldsymbol{b}_{ij}^c}{2}\right)|V_j|^2 - \boldsymbol{Y}_{ij}^* \frac{V_i^* V_j}{\boldsymbol{T}_{ij}^*} \quad \forall (i,j) \in E$$
 (6)

$$|S_{ij}| \le s_{ij}^{\boldsymbol{u}} \ \forall (i,j) \in E \cup E^R$$
 (7)

$$-\boldsymbol{\theta}_{ij}^{\Delta l} \le \angle(V_i V_j^*) \le \boldsymbol{\theta}_{ij}^{\Delta u} \ \forall (i,j) \in E$$