SDP for SRFLP

$$\min \quad K - \sum_{i<j} \frac{c_{ij}}{2} \left[\sum_{k<i} l_k X_{ki,kj} - \sum_{i<k<j} l_k X_{ik,kj} + \sum_{i<k} l_k X_{ik,jk} \right] \tag{1}$$

$$s.t. \quad X_{ij,jk} - X_{ij,ik} - X_{ik,jk} = -1 \quad \text{for all triples} i < j < k \tag{2}$$

$$diag(X) = e \tag{3}$$

$$rank(X) = 1 \tag{4}$$

$$X \succeq 0 \tag{5}$$

The constraints (3) is the equivalent to $X_{ij,ij} \in \{-1, 1\}$. The constraint (4) ensures that the matrix X has rank 1, which is part of the optimality condition for SDP. The constraint (5) ensures that the matrix X is positive semidefinite.