

# Supplementary Material for “Multi-period Equilibrium in Coupled Transportation System and Transactive Energy Community with Prosumers A Game-theoretic Approach”

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We calculate the Jacobian matrix  $JF(\gamma)$ , as follows:

$$JF(\gamma) = \begin{pmatrix} 2m^P & 0 & 0 & 0 & \cdots & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2m^Q & 0 & 0 & \cdots & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2m_w^{p_2} & 0 & \cdots & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2m_w^{q_2} & \cdots & 0 & 0 & 0 & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & 0 & 0 & 0 & \cdots & 0 & R_{mn} & 0 & -1 & 0 & 0 \\ 0 & 1 & 0 & 0 & \cdots & 0 & X_{mn} & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & \cdots & R_{mn} & X_{mn} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & 0 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & E_c \delta_{ake}^{rs} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \cdots & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

where  $\rho = \partial C_{t',t} / \partial f_{t',t}^{rs,kv}$ .