



Topological and Impedance Element Ranking (TIER) of the Bulk-Power System: Additional Slides

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FERC, September 2009

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Discussion

Alternate DC Optimal Power Flow –
common in production cost packages.

These typically use “Generation Shift
Factors” to treat facility constraints.
Eliminates all “intermediate” network
quantities, focuses in on only generator
powers as variables.

2

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Discussion

Alternate DC Optimal Power Flow

$$\min_{P_g} Cost(P_g)$$

subject to

$$\sum P_g - \sum P_d = 0 \quad \text{System Power Balance}$$

$$[S]P_g \leq P_{\text{limit}} \quad \text{Facility Limits (Select Facilities)}$$

where $[S]$ is a generation shift factor matrix



Discussion

Alternate DC Optimal Power Flow

$$\min_{P_g} Cost(P_g)$$

subject to

$$\sum P_g - \sum P_d = 0 \quad \text{System Power Balance}$$

$$\text{row k of } [S]P_g = P_{\text{limit}} \quad \text{Single Facility Limit}$$

Row k of $[S]$ matches our Lagrange multipliers, up to a uniform offset. The offset drops out in our next step, the standard deviation calculation that yields TIER.