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Cournot equilibrium calculation in power networks: An optimization approach with price response computation

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Abstract-

Since deregulated power markets are very often oligopolistic ones, efficient models that are able to describe strategic behavior of firms must be developed. In particular, transmission constraints can easily increase the opportunities of market players to exercise market power. This paper presents a model that describes the firms strategic interaction, based on Nash-Cournot equilibrium, when the power network is taken into account. Specifically, this paper introduces a new iterative algorithm, that explicitly considers how the production at a certain bus affects the whole network, and consequently models the opportunities for the firms of exercising market power, taking into account their ability to influence the composition of the set of constrained lines. The theoretical basis of the method as well as a case study based on the Central European network is included.

Index Terms- Game theory, interconnected power systems, oligopoly models, power system economics, transmission

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