Analysis of the effect of voltage level requirements on an electricity market equilibrium model

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Abstract— This paper presents a conjectural-variation-based equilibrium model of a single-price electricity market. The main characteristic of the model is that the market equilibrium equations incorporate the effect of the voltage constraints on the companies' strategic behavior. A two-stage optimization model is used to solve the market equilibrium. In the first stage, an equivalent optimization problem is used to compute the day-ahead market clearing process. In the second stage, some generation units have to modify their active and reactive power in order to meet the technical constraints of the transmission network. These generation changes are determined by computing an AC optimal power flow.

Index Terms— Voltage constraints; Equilibrium model; Conjectural variations; Electricity market

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