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Socially Structured Transferable Utility Game Applied to Electricity Markets

S. Balagopalan, S. Ashok, K.P. Mohandas

Abstract

The procedure of sharing the Transmission Service Charge (TSC) among the Discos, the players in an electricity market, is modeled as a Socially Structured Transferable Utility (SSTU) game. Such an algorithm requires a hierarchical ordering of the Discos, in a given social structure and a method of ranking them in a permutation. These parameters have been designed to be endogenous in electricity markets, modeled in a Cooperative game theory (CGT) environment using multilateral trades. A suitably crafted TSC is used as the characteristic value of the game to identify trades with least loss on transmission lines. The development of a power vector indicating the strength of the players, ranking based on objective of the game and design of TSC are in tune with the requirements of an electricity market, the multilateral trade structure, a CGT environment and the socially stable core. The combinatorial game is applied to a five bus power system and results are analyzed. This work is important in the context of a still embryonic electricity market requiring a reliable, secure and harmonious transmission sector.

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