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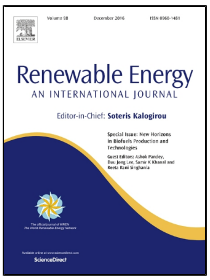

Evolution of a Transmission Network with High Proportion of Renewable Energy in the Future

Wei-qi Zhang, Xin-yan Zhang, Shao-wei Huang, Yu-kai Xia, Xiao-chao Fan, Sheng-wei Mei

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Highlights

(1)An evolution framework of transmission power system is established, which can handle the high permeability renewable energy.

(2)The proposed network simplification method based on PTDF can effectively reduce computing burden of evolution while keeping acceptable accuracy.

(3)An annual production simulation considering the fluctuation characteristic of renewable energy is constructed to find out the bottleneck that restricts the transmission capacity, which is the candidate of expansion branches. This also can be used for feasibility study and economic assessment of different evolution schemes.

(4)A grid evolution method based on heuristic algorithm is proposed to find out optimal expansion strategy.

(5)Production and evolution simulations are performed by using data from Zhejiang province under two scenarios with different permeability. Test results show that the proposed framework is a helpful way of network planning for power system with high proportion of renewable energy.