

Analysis of Safe Electricity Consumption on Load Side Based on Attack and Defence Game Model

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Abstract

With the improvement of digitalization and intelligence in the power system, the safe operation of the power system is facing enormous challenges. The safe use of electricity on the load side is the key to achieving safe and reliable power system operation. The detection party needs amounts of human and material resources when the power network is attacked. In response to the current difficulties of low detection ability and high detection costs, this paper proposes an attack and defence game model that considers the differences between different nodes, ensuring the safety and economy of electricity consumption while reducing energy waste. At first, the structure of smart meters and the attack characteristics of intruders are summarized, and a basic attack and defence game model is constructed. The Nash equilibrium is then solved, and the optimal strategy for the game between the defender and the intruder is given to balance the relation between detection performance and energy consumption. In response to the differences generated by each node, strategies for attackers to launch attacks on different nodes and the setting of optimal thresholds for other nodes in the defence system are explored. Finally, case studies verify that the proposed model could reduce the cost of intruder detection while ensuring a specific detection rate.

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