

Influence of DVR on Adjacent Load and Its Compensation Strategy Design Based on Externality Theory

Abstract

Dynamic voltage restorer (DVR) is a compensation device that can effectively improve power quality, and it is widely used to compensate the voltage sag on sensitive loads. However, DVR will affect the operation of the sensitive loads in parallel at the same busbar (such parallel are defined as adjacent loads) in the process of improving sensitive load voltage quality. With the externality theory, this paper proposes a solution to clarify the influence of DVR on the adjacent load and handle the possible controversy. This paper first establishes a simple system that consists of a DVR, sensitive loads, and adjacent loads. Based on the equivalent network, the influence of the DVR on the adjacent load is analyzed in terms of voltage change and power consumed. The externality boundaries are clearly defined when considering network parameters in order to fairly deal with the interaction of multi entities. Afterwards, an optimization compensation strategy that is based on externality theory is proposed. Finally, the simulation on compensation strategy is tested on the MATLAB/Simulink platform to demonstrate the feasibility and effectiveness of the proposed method.