

عنوان مقاله:

A Particle Swarm Optimization Approach for Robust Unit Commitment with Significant Vehicle to Grid Penetration

محل انتشار:

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خلاصه مقاله:

Smartening of contemporaneous power delivery systems in conjunction with increased penetration of vehicle to grid (V2G) technology, changes the way market participants play their role in the market operation to maximize their profit. In V2G technology, plug-in electric vehicles (PEV) have bidirectional power flows i.e. they can either inject power to the grid or draw power from it. In recent years, the V2G technology has found a world wide attention due to its important advantages such as the peak load reduction and providing system reserve, to name a few. The unit commitment (UC) is a power system operation problem which is used to find the optimal operation schedule of generation units. The UC itself is a complicated, high computational burden required, and a time demanding problem to solve. In this paper, the binary and discrete particle swarm optimization (PSO) is used to solve the UC problem with V2G technology since it can solve complex constrained optimization problems, reliably and quickly without any dimension limitation. In this work, the V2G benefits from spot price variations and charges itself in the low price hours and discharge its power to the grid in high price hours taking into account its state of charge (SOC) limitations. This matter encourages V2G owners to receive power from grid in off peak hours and inject power to the grid in the peak load and consequently help to manage the load pattern. In this paper, a number of V2G parking lots, with different number of PEVs that travel in different paths at different times with different traveling times are considered. The proposed methodology is justified by two dimensionally different case studies including a 6- bus and a 118- bus test systems. The PEV can obtain considerable profits due to variation of spot prices. Existence of PEVs in the system helps the independent system operator (ISO) to manage the load pattern.

کلمات کلیدی:

Particle swarm optimization, plug-in electric vehicles, unit commitment, vehicle to grid

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