عنوان مقاله:

Risk-Cost Minimization in Optimal Reactive Power Dispatch Problem in the DFIG Integrated System

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خلاصه مقاله:

In this paper, a novel method for a multi-objective and risk-based optimal reactive power dispatch is proposed. The method includes two main objective functions: technical and economic. The technical objective involves minimizing the risks of voltage instability, voltage deviation, and flow violation, and the economic objective involves minimizing the costs of reactive power generation, active power losses, load shedding, and active power rescheduling. Using these functions and assigning different weighting factors for each sub-objective, the risk of the events or uncertainties to customers or the grid can be managed. In addition, moment matching is used to discretize and create scenarios from continues probability distribution functions of wind speed and electrical energy uncertainties. As the number of uncertain variables increases, so does the number of scenarios and the simulation time. Therefore, the fast-forward selection algorithm is applied to reduce the number of scenarios. To reduce the computational complexity and the number of topological scenarios, a new contingency filtering method based on high-risky events is proposed. A modified multi-objective PSO algorithm based on a hybrid PSO with sine-cosine acceleration coefficients is proposed to find the Pareto front of solutions. The method is implemented on the modified IEEE ۳۰-bus test system. To demonstrate the effectiveness of the proposed method, the results are compared with previously published literature. The results show that risk-based scheduling increases system reliability and cost-effectiveness compared to traditional .scheduling

کلمات کلیدی:

Multi-objective risk-based optimal reactive power dispatch, Voltage instability Risk, Power system uncertainty, Hybrid multi objective PSO with sine cosine acceleration coefficients