Mohammad Ali Alipour and Alireza Askarzadeh, 2024, A risk-averse strategy based on information gap decision theory for optimal placement of service transformers in distribution networks, April 2024, *IET Generation, Transmission & Distribution,* 2024; 1–21. DOI: 10.1049/gtd2.13167.

Abstract In distribution networks, among the planning problems, optimal placement of medium voltage to low voltage (MV/LV) transformers is a vital and challenging issue. Electrical load uncertainty is an important factor that affects the result of this planning problem. This paper investigates optimal allocation of service transformers with respect to the load uncertainty modelled by information gap decision theory (IGDT). For this aim, the planning problem is solved in risk-neutral (RN) and risk-averse (RA) frameworks. In RN strategy, objective function is defined to minimize the cost of service transformers and low voltage feeders as well as the cost of power losses. On the other hand, in RA strategy, objective function is defined to maximize the radius of the uncertainty in such a way that any deviation of the uncertain parameter results in an objective function value that is not worse than the critical limit. The optimization problem is solved by crow search algorithm (CSA) and particle swarm optimization (PSO) and the results are compared. In mid-term planning, with respect to the deviation factors of 0.05, 0.1, 0.15, 0.2, 0.25 and 0.3, optimal values of the uncertainty radius are 5.89%, 13.64%, 21.37%, 28.97%, 34.39% and 43.46%, respectively. In long-term planning, with respect to the deviation factors of 0.05, 0.1, 0.15, 0.2, 0.25 and 0.3, optimal values of the uncertainty radius are 6.92%, 13.33%, 20.39%, 27.03%, 34% and 40.46%, respectively. Moreover, on average, CSA finds more promising results than PSO.

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