This paper presents a methodology for optimal distribution system feeder reconfiguration and distributed generation (DG) placement in distribution system considering different model of DGs with an objective power loss reduction and voltage stability enhancement. The distributed generation availability of wind turbines, solar photovoltaic panels and fuel cell etc., are classified into different models according to their operation modes and control characteristics. Variable scaling hybrid differential evolution (VSHDE) has been applied to solve feeder reconfiguration of DGs. The variable scaling factor is used in the VSHDE method to overcome the drawback of the fixed and random scaling factor and alleviate the problem of the selection of a mutation operator in the hybrid differential evolution (HDE). Aiming to the problem that the reactive power output of PV model sometimes exceeds the limit, this paper researches the impact factors of the output reactive power during reconfigurations, such as rated active power and rated voltage magnitude. The developed methodology is tested on 2 systems with 11-bus, IEEE 33-bus distribution system. The study results indicate that for a given set of distributed generators and their locations, the proposed method can identify optimal on/off patterns of the switches that yield the minimum loss, meliorated voltage profile and while satisfying the constraints.

Keywords: Distribution system reconfiguration, power loss reduction, voltage stability enhancement, variable scaling hybrid differential evolution (VSHDE)
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