

Abstract

PV distributed generation systems can make a positive contribution to the sustainability in developing countries that have access to electricity grid. Thailand is a tropical country and has plenty of sunshine. Therefore, the country has abundant of solar resource to generate electricity. Integration of solar photovoltaic system with grid connection would assist in supplementing the continually increasing of electricity need in Thailand. Greater use of PV distributed generation systems can also increase reliability of the electricity grid. Many problems exist arising from the operation of PV distributed generators jointly with the grid. Particularly, optimal placement and sizing of such system need to be optimized for improving voltage support in distribution networks. Therefore, it is necessary to take into account optimal allocation and sizing of PV grid connected in distribution systems during the design stage.

With the increase of PV distributed generation systems that are happening nowadays, the application of particle swarm technique which is the useful tool for system design and sizing for an actual feeder are presented in this study. The methodology applies the Particle Swarm Optimization (PSO) in order to minimize the system loss. Minimum system losses are obtained subjected to power constraint, voltage constraint and current limit. The methodology is tested on the 26-bus and the 59-bus radial distribution systems modified from the PEA distribution systems. The results indicate that the optimal placement and sizing of DG could be found using the application of PSO. The optimal DG can reduce the system losses.

Keywords: *Distributed Generation (DG), Particle Swarm Optimization (PSO), Photovoltaic (PV), PV distributed generation system, Very Small Scale Power Producer (VSPP)*