

INCREASING PENETRATION OF DISTRIBUTED GENERATION IN EXISTING DISTRIBUTION NETWORKS USING COORDINATED VOLTAGE CONTROL

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ABSTRACT

Connections of distributed generation (DG) to weak distribution networks often experience voltage rise problems. The voltage rise caused by DG can be reduced with passive methods such as increasing the conductor size but this can be quite expensive. Active management of distribution networks can allow connection of more DG into existing distribution networks and, consequently, reduce the connection costs of DG. Voltage rise can be mitigated for instance by reducing the substation voltage or by controlling the active and reactive power of DGs.

In this article, active voltage level management of distribution networks with DG is studied. A coordinated voltage control algorithm that controls the substation voltage and DG reactive power is proposed and its operation is tested using time domain simulations. The simulations are carried out in an example network that is a real distribution network located in central Finland and will experience voltage rise problems if a hydro power plant is connected to the network.