World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:11, No:07, 2017

Distributed Generation Connection to the Network: Obtaining Stability Using Transient Behavior

Authors : A. Hadadi, M. Abdollahi, A. Dustmohammadi

Abstract : The growing use of DGs in distribution networks provide many advantages and also cause new problems which should be anticipated and be solved with appropriate solutions. One of the problems is transient voltage drop and short circuit in the electrical network, in the presence of distributed generation - which can lead to instability. The appearance of the short circuit will cause loss of generator synchronism, even though if it would be able to recover synchronizing mode after removing faulty generator, it will be stable. In order to increase system reliability and generator lifetime, some strategies should be planned to apply even in some situations which a fault prevent generators from separation. In this paper, one fault current limiter is installed due to prevent DGs separation from the grid when fault occurs. Furthermore, an innovative objective function is applied to determine the impedance optimal amount of fault current limiter in order to improve transient stability of distributed generation. Fault current limiter can prevent generator rotor's sudden acceleration after fault occurrence and thereby improve the network transient stability by reducing the current flow in a fast and effective manner. In fact, by applying created impedance by fault current limiter when a short circuit happens on the path of current injection DG to the fault location, the critical fault clearing time improve remarkably. Therefore, protective relay has more time to clear fault and isolate the fault zone without any instability. Finally, different transient scenarios of connection plan sustainability of small scale synchronous generators to the distribution network are presented.

Keywords : critical clearing time, fault current limiter, synchronous generator, transient stability, transient states
Conference Title : ICPSDPE 2017 : International Conference on Power Systems and Distribution in Power Engineering
Conference Location : Amsterdam, Netherlands
Conference Dates : July 10-11, 2017