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# Voltage Stability Margin-Based Approach for Placement of Distributed Generators in Power Systems

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**Abstract :** Voltage stability analysis is crucial to the reliable and economic operation of power systems. The power system of developing nations is more susceptible to failures due to the continuously increasing load demand, which is not matched with generation increase and efficient transmission infrastructures. Thus, most power systems are heavily stressed, and the planning of extra generation from distributed generation sources needs to be efficiently done so as to ensure the security of the power system. Some voltage stability index-based approach for DG siting has been reported in the literature. However, most of the existing voltage stability indices, though sufficient, are found to be inaccurate, especially for overloaded power systems. In this paper, the performance of a relatively different approach using a line voltage stability margin indicator, which has proven to have better accuracy, has been presented and compared with a conventional line voltage stability index for DG siting using the Nigerian 28 bus system. Critical boundary index (CBI) for voltage stability margin estimation was deployed to identify suitable locations for DG placement, and the performance was compared with DG placement using the Novel Line Stability Index (NLSI) approach. From the simulation results, both CBI and NLSI agreed greatly on suitable locations for DG on the test system; while CBI identified bus 18 as the most suitable at system overload, NLSI identified bus 8 to be the most suitable. Considering the effect of the DG placement at the selected buses on the voltage magnitude profile, the result shows that the DG placed on bus 18 identified by CBI improved the performance of the power system better.

**Keywords :** voltage stability analysis, voltage collapse, voltage stability index, distributed generation
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