

Differential evolution optimization algorithm based on generation systems reliability assessment integrated with wind energy

ABSTRACT

Generating systems are said to be adequately reliable when they can satisfy the load demand. Meanwhile, the reliability of electrical systems is currently being influenced by the increasing acceptance of "Wind Energy Conversion System" (WECS) in power systems compared to other conventional sources. This study proposed a novel optimization method labeled the "Differential Evolution Optimization Algorithm" (DEOA) to assess the reliability of power generation systems (PGS). The DEOA technique is used to improve the assessment of the reliability and adequacy of the generation systems by incorporating wind energy from a WECS. The basis of DEOA is the meta-heuristic searching used to simulate the generation systems operation and considering the random failures of existing systems and the unstable character of WECS-sourced wind energy. The effectiveness of the suggested algorithm to assess the reliability and adequacy of power generation systems with WECS was demonstrated. Additionally, the efficiency of the planned algorithm in numerical simulation was compared to that of the "Monte Carlo simulation" (MCS).

Keyword: Reliability assessment; Generating system; Differential evolution optimization algorithm; Wind energy