Distribution Network Reconfiguration for Transmission Loss Minimization and Voltage Profile Improvement Using Salp Swarm Optimization Algorithm

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Abstract The increased human population along with the advancements and demand for electrical appliances has led to the continuous overstretch of the existing power transmission lines. This tends to overload the transmission system, which results in an excessive power loss and subsequent system outage. Optimal reactive power dispatch (ORPD) is a mechanism deployed to ensure a secured operation as well as an economically viable power system network. ORPD is an optimal power dispatch technique that minimizes transmission line losses while adhering to both equality and non-equality constraints. This research study employed Salp Swarm Algorithm (SSA) to obtain the best vector control variables that give the minimal total active power loss on a standard IEEE 30-bus system network. The result obtained was compared against Particle Swarm Optimization (PSO), where SSA proves to be superior over PSO in the field ORPD.

Keywords Optimal reactive-power dispatch · Salp Swarm algorithm · Nature-inspired optimization algorithms · Loss minimization · IEEE 30-bus system network

1 Introduction

A critical economic indicator in the present-day world is the measure of the amount of electricity a country/nation is capable of generating. By virtue of this, the need for stable, sustainable, sufficient as well as steady electrical power system network

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