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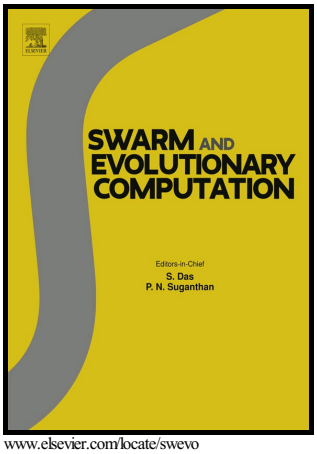

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Quasi-oppositional symbiotic organism search algorithm applied to load frequency control

Dipayan Guha[1*], Provas Roy[2], Subrata Banerjee[3]

[1]Department of Electrical Engineering, Dr. B.C.Roy Engineering College, Durgapur, West Bengal, India.

[2]Department of Electrical Engineering, Jalpaiguri government Engineering College, Jalpaiguri, West Bengal, India.

[3]Department of Electrical Engineering, National Institute of Technology, Durgapur, West Bengal, India.

Abstract

The present work approaches a relatively new optimization scheme called "quasi-oppositional symbiotic organism search (QOSOS) algorithm", for the first time, to find an optimal and effective solution for load frequency control (LFC) problem of the power system. The symbiotic organism search (SOS) algorithm works on the effect of symbiotic interaction strategies adopted by an organism to survive and propagate in the ecosystem. To avoid the suboptimal solution and to accelerate the convergence speed, the theory of quasi-oppositional based learning (Q-OBL) is integrated with original SOS and used to solve the LFC problem. To demonstrate the effectiveness of QOSOS algorithm, two-area interconnected power system with nonlinearity effect of governor dead band and generation rate constraint is considered at the first instant, followed by the four-area power system showing the consequence of load perturbation. The structural simplicity, robust performance and acceptability of well-popular proportional-integral-derivative (PID) controller enforce to implement it as a secondary controller for the present analysis. The success of QOSOS algorithm is established by comparing the dynamic performances of concerned power system with those obtained by some recently published algorithms available in the literature. Furthermore, the robustness and sensitivity are analyzed for the concerned power system to judge the efficacy of the proposed QOSOS approach.