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AN IMPROVED FUZZY PARTICLE SWARM OPTIMIZATION FOR NUMERICAL OPTIMIZATION

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Abstract. Fuzzy particle swarm optimization (FPSO) is a new variant of particle swarm optimization (PSO). Compared to PSO, each particle in FPSO is attracted by its previous best particle and other particles (not the global best particle) selected by a fuzzy mechanism. Although FPSO effectively slows down the attraction of the previous best particle and the global best particle, it shows slow convergence rate when solving complex optimization problems. To enhance the performance of FPSO, this paper proposes an improved FPSO algorithm (IFPSO) which employs two strategies including generalized opposition-based learning (GOBL) and Lévy mutation. In order to verify the performance of our approach, thirteen well-known benchmark functions and a real-world optimization problem are used in the experiments. Simulation results show that our approach can significantly improve the performance of FPSO and outperforms several other state-of-the-art PSO algorithms.

Keywords. Particle swarm optimization (PSO), fuzzy PSO, generalized opposition-based learning, numerical optimization.

AMS (MOS) subject classification: 90C15.

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