

Article Abstract

Title:	Optimal trading strategy for GenCo in LMP-based and bilateral markets using self-organising hierarchical PSO
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Abstract:	This paper proposes an optimal trading strategy for a generation company (GenCo) in multi-market environment including day-ahead spot and long term bilateral contract markets using self-organising hierarchical particle swarm optimisation with time-varying acceleration coefficients (SPSO-TVAC). The proposed trading strategy is formulated as a two-stage optimization problem. Firstly, the GenCo's objective model which is to maximise expected profit and to minimise risk of profit variation is solved by SPSO-TVAC. Secondly, the market clearing model which is to minimise system cost of locational marginal price (LMP) based market is solved by DC optimal power flow (DCOPF). The Monte Carlo method is employed to simulate other bidders' behaviour in competitive environment. Test results on the PJM 5-bus system indicate that SPSO-TVAC is superior to inertia weight approach particle swarm optimisation (IWAPSO) and genetic algorithm (GA) in searching the optimal trading solution. In addition, different bilateral contract prices and spot demand significantly impact GenCos' trading behaviour. Accordingly, the proposed approach could be a beneficial decision-making tool for a GenCo in energy trading.
Keywords:	Optimal bidding strategy, energy trading, locational marginal price, bilateral contract market, particle swarm optimisation, Monte Carlo simulation.