ADAPTIVE PSO BASED REAL CODED ALGORITHM FOR UNIT COMMITMENT

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Abstract

This paper presents an adaptive PSO based technique that involves real number matrix representing generation schedule for unit commitment. The new generation scheme for initial population and the repairing mechanism attempt to reduce the overall computation time. The algorithm adoptively adjusts the inertia weight and the acceleration coefficients in order to enhance the search process. Numerical results on systems up to 100 generating units display the effectiveness of the proposed strategy.

Keywords: Unit commitment; particle swarm optimization.

Nomenclature

ACT	Average Computation Time
ED	Economic Load Dispatch
EPM	EP based Method
FLAPC	Full Load Average Production Cost
GAM	GA based Method
LRM	Lagrangian Relaxation Method
LRGAM	combined LR and GA based method
PSO	Particle Swarm Optimization
PA	Proposed Algorithm
UC	Unit Commitment
a, b, c	fuel cost coefficients
CST_i	cold start up cost of unit-i ($)
c_1 & c_2	acceleration coefficients
$F(P_i^t)$	generator fuel cost function ($/hr)
G	real number matrix
$G_{i,t}$	real power generation of unit i at hour-t
HST_i	hot start up cost of unit-i ($)
K^{max}	maximum number of iterations
N	number of generating units
n	number of particles in the population
P_i^{min} & P_i^{max}	minimum and maximum real power generation of unit i respectively
P_i^t	real power generation of unit-i at hour-t
$P^t{}_{load}$	load demand at hour-t
R^t	spinning reserve at hour-t
r_1 & r_2	uniformly distributed random numbers in the range of [0,1]
ST_i^t	startup cost of unit-i at hour-t
T	total number of hours
T_i^{cold}	cold start hour of unit-i (hours)

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JS Bruner

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