ABSTRACT

This investigation proposes a new algorithm for the solution of multi-objective, short-term hydrothermal scheduling problem. In the traditional algorithm using ‘Weighting method’, a set of weight vectors are fed in, for each weight vector objective function values during the optimization interval and the corresponding fuzzy membership functions are computed and the best compromise solution is identified from the set of non-inferior solutions obtained. In the proposed algorithm, a set of weight vectors are genetically generated and the best solution is identified as described above. Further the weight vectors are genetically modified and the process is repeated to identify the best solution using the modified weight vectors. The process is continued till change in the fitness value of the best solution is marginal.

The investigation further proposes three methods for determining objective function values in the optimization interval, which is a major sub-process in the above algorithm. These are; the Newton-Raphson method, a method involving a genetic search and a method involving a random search. In the genetic search method search space reduction technique is incorporated to speed-up the search and fuzzy multipliers are used to reduce the number of iterations to satisfy hydro and coal constraints. The above two modifications are incorporated in random search method also, but search space reduction technique is essential for random search method. A coal-constrained thermal plant is introduced to make the scheduling problem more universal. N-R method solves the problem in minimum time but complexity is the most. Genetic search method is simple, but very slow due to numerous operations to be performed on binary strings. Random search method is much faster than genetic search method and the simplest of all.