A Triple-Stage Algorithm for Optimal Unit Scheduling of Thermal Units

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Abstract — Scheduling the economic generation of thermal units is a critical task in a large scale power system because it significantly reduces annual production cost. This study presents a novel triple-stage algorithm to solve the problem of combining unit commitment and economic dispatch of the thermal units while minimizing cost. The proposed algorithm divides all the units into five groups and finds potential combinations with a redundancy factor in the first stage. Then, employ a simplified economic dispatch method and a look forward method to obtain the optimal unit scheduling in the second stage. Lastly, a look backward method is applied to refine the optimal solution in the last stage. When the discontinuous cost function of unit is considered, a zero cost power method is also used to evaluate the solution. Finally, three test cases are simulated and the results compared with existing methods. Simulation results demonstrate the outstanding performance of the proposed method.

Index Terms — Unit commitment, generation dispatch, discontinuous cost function, ramp rate constraint.

VII. REFERENCES


VIII. BIOGRAPHIES

Sun-Nien Yu was born on April 1966 in Miaoli, Taiwan. He received his B. S. and M. S. degrees in Electric Engineering from National Taiwan Institute of Technology in 1991 and 1993 respectively. Since 1996, he has been with Chung Chou Institute of Technology and he is an associate professor of electrical engineering now. His research interests are in the operation, planning and analysis of power systems.