Grey Wolf Optimization for optimal dispatching and economic operation of cascade pumping stations in water conveyance system

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An optimum dispatching and operation schedule of cascade pumping stations may reduce the cost significantly while maintaining the hydraulics in an acceptable range. A general optimization routine integrated with hydraulic simulations model to obtain the optimum dispatching and operation schedule of cascade pumping stations in this paper. To reduce the computational time, an application of the Grey Wolf Optimization(GWO) framework is developed, and a new strategy of narrowing the feasible region of the optimum dispatching and operation problem of cascade pumping stations is proposed. Moreover, this paper present a new strategy to handle the various constraints of the optimum dispatching and operation problem of cascade pumping stations. The results solved by this proposed strategy can strictly satisfy the constraints of the problem. Finally, the feasibility and effectiveness of GWO algorithm is validated by a test system containing six pumping stations. The results demonstrate that GWO can get a better solution in both robustness and accuracy while compared with PSO.