CHOPIN, a heuristic model for long term transmission expansion planning

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Abstract-

This paper describes the long term transmission expansion planning model CHOPIN. In CHOPIN, the network expansion is formulated as the static optimization problem of minimizing the global annual cost of electricity production, which is obtained as the sum of the annualized network investment cost, the operation cost and the reliability cost. The solution method takes advantage of the natural decomposition between the investment and operation submodels. The investment submodel is solved by a new heuristic procedure that in practice has invariably yielded the optimal plan. At the operation level CHOPIN optimizes over a multiplicity of scenarios which are characterized by the demand, the hydraulicity and the availability of components. The network is represented by any one out of four options: DC load flow (DCLF), transportation model and two hybrid models. Any of these models may consider the ohmic losses. The model is very efficient computationally; this fact was verified on rest examples, as well as on the actual transmission expansion planning of the Spanish system.

Index Terms- Power system planning, Transmission expansion planning, Mathematical programming, Heuristic optimization

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