

# **A two-stage strategy for security-constrained AC dynamic Transmission Expansion Planning**

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## **Abstract-**

**This paper presents a new and promising strategy organized in two stages to solve the dynamic multiyear transmission expansion planning, TEP, problem. Specifically, the first stage is related to the reduction of the search space size and it is conducted by a novel constructive heuristic algorithm (CHA). The second one is responsible for the refinement of the optimal solution plan and it uses a novel evolutionary algorithm based on the best features of particle swarm optimization (PSO) and genetic algorithm (GA). The planning problem is modelled as a dynamic and multiyear approach to ensure that it keeps a holistic view over the entire planning horizon and it aims at minimizing the total system costs comprising the investment and operation costs. Additionally, the N-1 contingency criterion is also considered in the problem. The developed approach was tested using the IEEE 118-Bus test system and the obtained results demonstrate its advantages in terms of efficiency and required computational time. Furthermore, the results demonstrated that the novel strategy can enable the utilization of the AC optimal power flow (OPF) in a faster and reliable way when compared to the standard and widespread DC-OPF model.**

**Index Terms-** AC-optimal power flow; DC-optimal power; EPSO-u; Security CHA; Transmission expansion planning

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