



COMPARISON OF AC AND DC OPTIMAL POWER FLOW MODELS FOR APPLICATION IN LONG-TERM DEVELOPMENT PLANNING

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ABSTRACT

Increasing integration in the Baltic electricity market and Europe-wide interconnection establishment makes it necessary to consider markets principals for power system development planning. The Optimal Power Flow (OPF) is one of the fundamental problems in power system analyses. Long-term development planning typically requires a large number of repetitive OPF solutions. In this comparison, the calculation speed of the OPF solutions beside their accuracy is observed. The full alternating current OPF is accurate, but takes long solution time. The direct current OPF is a simple approximation of OPF that is very fast but is not so accurate.

The paper first provides a general explanation of proposed method of zonal prices determination, which is based on Interior Point Method (IPM) for finding maxima of Social Welfare or minima of production costs subject to power system constraints. Comparison of ACOPF and DCOPF models was implemented in Matlab environment.

The paper second part provides case studies using both a small 4 bus system and a somewhat larger 98 bus model of the Baltic Ring transmission grid. Results are provided comparing both the accuracy (generation levels, line flows, and voltage angles) and the computational requirements of the two models.

Keywords: electricity market, optimal power flow, power system, power system development