Challenges and future trends in security constrained optimal power flow computations

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The security constrained optimal power flow (SCOPF) is a very important tool which is used especially for day-ahead operational planning of power systems. The SCOPF problem is a nonlinear, non-convex, large-scale optimization problem, with both continuous and discrete variables, which belongs therefore to the class of optimization problems called Mixed Integer Non-Linear Programming (MINLP).

This talks addresses the main challenges to SCOPF computations.

We will first discuss the issues related to the SCOPF problem formulation such as the adequate choice of a limited number of corrective actions in the post-contingency states and the modeling of voltage and transient stability constraints.

Then we will address the challenges to the techniques for solving the SCOPF, focusing mainly on: approaches to reduce the size of the problem by either efficiently identifying the binding contingencies at the optimum or by using approximate models for the post-contingency states, and the handling of discrete variables.

We will finally discuss the current trend of extending the SCOPF formulation to take into account the increasing levels of uncertainty in the operation planning.

CV:

Florin Capitanescu works as a research engineer at the University of Liege (Belgium). He graduated in Electrical Power Engineering from the University Politehnica of Bucharest (Romania) in 1997. He obtained the Ph.D. degree from the University of Liege in 2003. His main research interests lie in the field of power systems planning, operation and control. His research is particularly focussed on applications of optimization methods (LP, NLP, MILP, MINLP, MPEC) in the field of power systems, in particular (security-constrained) optimal power flow, and voltage stability.