POWER ENGINEERING SOFTWARE SOLUTIONS

CYME INTERNATIONAL T&D

TRANSMISSION & INDUSTRIAL SYSTEM ANALYSIS

Optimal Power Flow | Power Flow | Short-Circuit | Harmonics | Voltage Stability | And more...

CYMOPF, Optimal Power Flow

CYMOPF, the Optimal Power Flow analysis module of PSAF, supplements the analytical capability of PSAF by allowing the user to engage in advanced system planning studies to optimize system performance, examine cost-efficient operational planning alternatives, articulate system control strategies and rationalize equipment utilization, resulting in better overall system asset management.

CYMOPF calculates the "best possible" values for "higher level set points" considering a set of user-specified objective functions and a number of constraints. In this way, CYMOPF adds intelligence and, consequently, improves efficiency and throughput of power system studies significantly.

Program Features

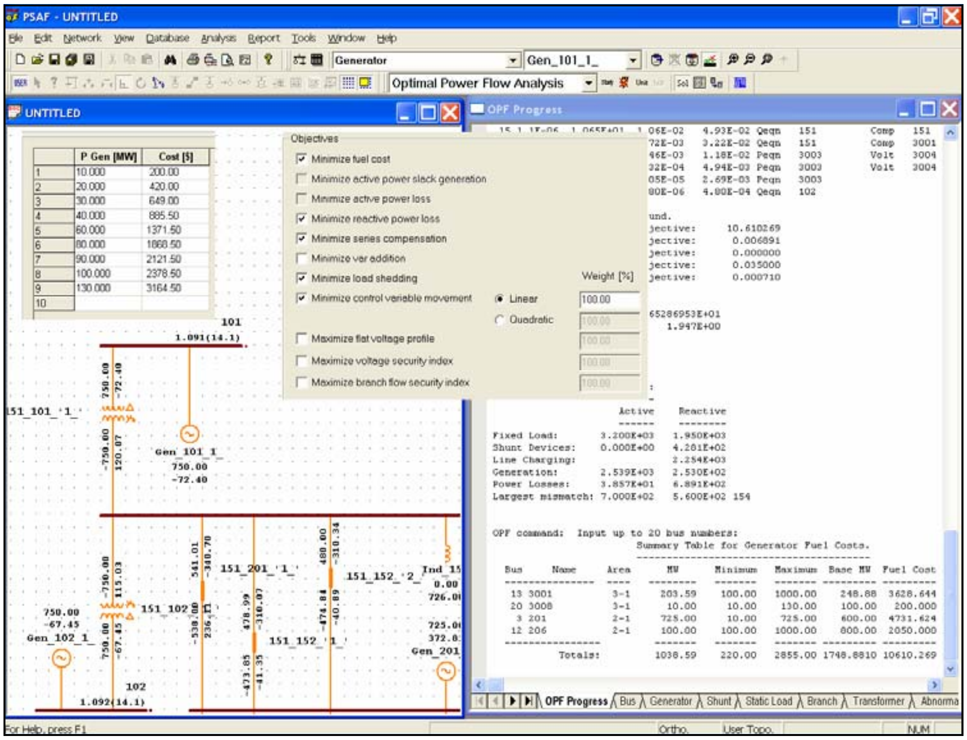
Algorithm

CYMOPF relies on robust barrier-method based nonlinear optimization techniques that permit fully coupled optimization, with the entire set of system control variables, including generation schedules, transformer taps, phase shifter settings, etc.

System constraints

System equipment constraints are observed, in particular bus voltages and line flows. More specifically, CYMOPF recognizes the following constraints:

- Bus voltage magnitude limits.
- Branch flow limits (MW, MVAR, MVA, Amps).
- Generator reactive power limits.
- Generator active power limits.
- Adjustable bus shunt limits.
- Adjustable branch reactance limits.
- Adjustable load limits.
- Transformer tap changer limits.
- System constraints are either set individually or globally for different system studies.



Infeasibility Handling and Convergence Difficulty

CYMOPF includes infeasibility handling through automatic relaxation of immediate binding constraints and comprehensive constraint ranking severity indicators for cases that exhibit convergence difficulty.

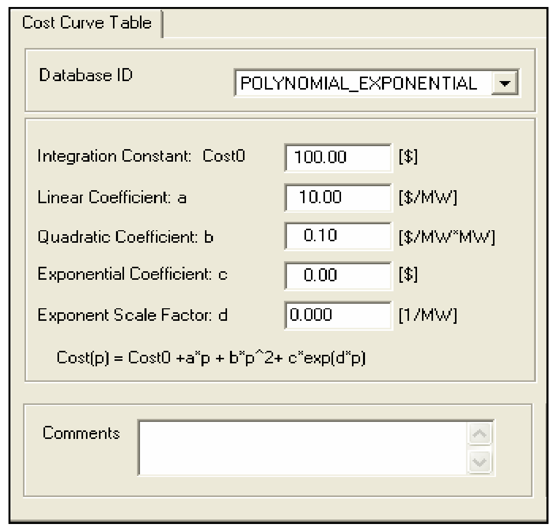
Analytical Capabilities

CYMOPF is aptly suited in solving many problems typically found in today's less-regulated power markets such as:

- Scheduling of Ancillary Services for reactive power and active power.
- Development of system reference scenarios.
- Voltage collapse analysis.
- Transfer capability investigation.
- Location based marginal cost assessment.
- Implicit penalty function consideration.

In order to solve such problems the following objective functions are supported in CYMOPF:

- Minimize fuel costs based on the either of the following functions:
  - Piece-Wise Linear,
  - Piece-Wise Quadratic,
  - Polynomial - Exponential.
- Minimize active power slack generation.
- Minimize active power loss.
- Minimize reactive power loss.
- Minimize Series Compensation.
- Minimize Reactive Power addition.
- Minimize Load Shedding.
- Minimize the control variable movement Linear or Quadratic.
- Maximize flat voltage profile.
- Maximize voltage security index.
- Maximize branch flow security index.



CYMOPF will also support multiple valid combinations of the above listed objective optimization functions while strictly respecting system constraints. System controls are automatically adjusted to provide least cost design or an operational mix.

The optimal solution insures that system losses, generation costs, Reactive Power support requirements and different objectives are simultaneously optimized.

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