POWER ENGINEERING SOFTWARE SOLUTIONS

CYME INTERNATIONAL T&D

TRANSMISSION & INDUSTRIAL SYSTEM ANALYSIS

CYMVSTAB, Voltage Stability

CYMVSTAB is the analysis module of PSAF dedicated for the voltage security assessment of power systems. In planning and operating today's stressed power systems, the ability to maintain voltage stability has become a growing concern. CYMVSTAB is designed to meet this challenge by assessing the ability of the power system to maintain stable voltages under different contingencies and loading conditions.

Power system voltage instability is related to the lack of reactive power resources in the network. This is very similar to frequency instability in transient stability studies for systems that do not have sufficient spinning reserve.

Program Features

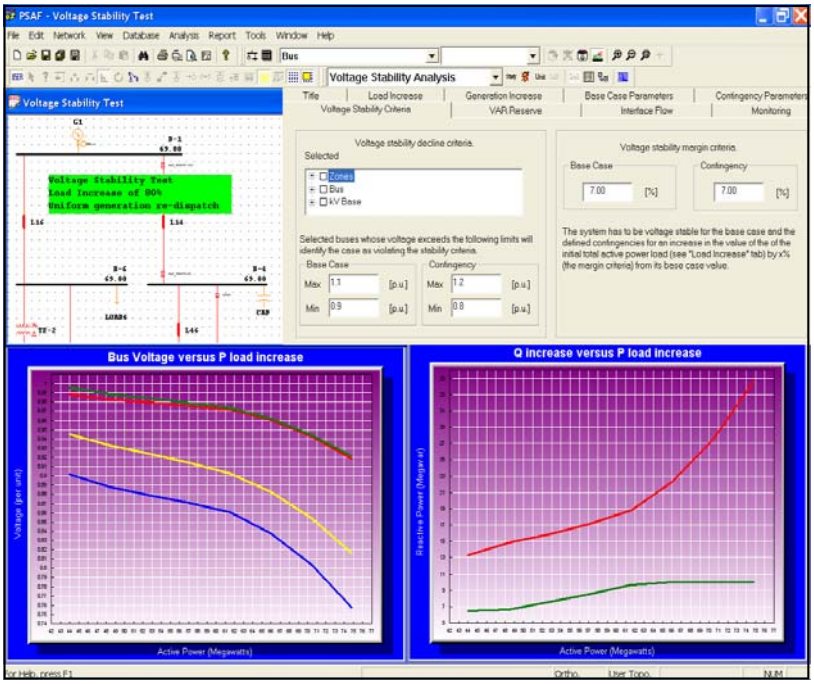
Many aspects of voltage stability problems can be effectively analyzed with the Steady state or Static Power Flow based domain for a specified operating condition of the power system.

CYMVSTAB offers the user the same common format as our Power Flow Program CYMFLOW for entering the network data, defining the study parameters, report options and solving the network.

The program assess the voltage stability of a network by means of the two most common static voltage stability analysis techniques.

- P-V Analysis (P-V Curves)
- V-Q Analysis (V-Q Curves)

All curves of monitored variables can be exported to CYMVIEW, which is capable of managing the outputs of different modules and storing the results for any number of simulations generated by CYMVSTAB.



P-V Analysis Approach

CYMVSTAB offers a comprehensive P-V voltage stability study analysis approach for the base case and for any credible contingency against which the voltage stability of the system is to be evaluated.

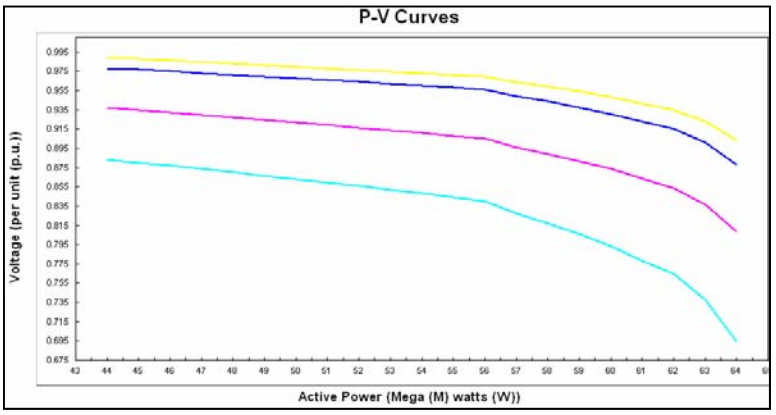
This is achieved by scaling up all the loads in user-defined steps for a given network, base case and all defined contingencies, either by Bus, Areas, Zones or Globally.

The steady-state P-V approach dictates that for each load increase, pertinent generators within the system, should be re-dispatched to match this load increase.

CYMVSTAB offers the choice of three methods of Generation re-dispatch namely:

- Uniform Generation
- Inertial Power Flow
- Governor Response

The load flow is solved for each load profile while monitoring the bus voltages over a range of variation of the key system parameter which in CYMVSTAB is the load. Reactive power of a defined group of generators, reactive power reserve, and interface flow can also be monitored and reported.



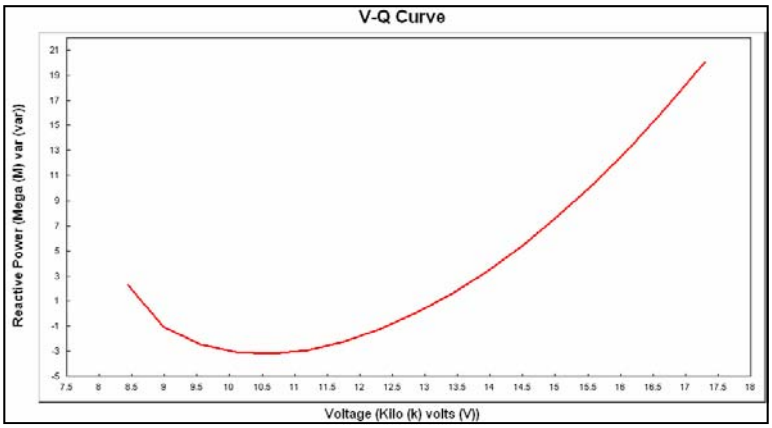
Total Area MW Load versus Bus Voltage Magnitude

The V-Q Analysis Approach

The V-Q approach is a steady-state tool that develops a curve, which relates voltage at a bus to the reactive power necessary to reach this voltage.

The V-Q curve generated represents the system voltage behavior when increased reactive power is withdrawn from a specific test bus, which is typically a critical bus in the network.

In other words, to determine the maximum reactive power that can be withdrawn before the voltage collapse of the system.



Bus Voltage Magnitude versus Reactive Power

Modal Analysis

In addition to the voltage stability analysis techniques, there is a need for analytical tools capable of predicting voltage collapse in complex networks, accurately quantifying stability margins, power transfer limits, identifying voltage-weak points and areas susceptible to voltage instability.

The voltage stability module CYMVSTAB our PSAF series of programs can identify the contributing factors and sensitivities which in turn provide insight into system characteristics that are key elements for the development of remedial actions in the network.

The modal analysis incorporated in CYMVSTAB is designed to meet the above requirements by computing:

- The eigenvalues that identify the different modes, which the system could become voltage instable.
- The eigenvectors that provide information related to the mechanism of loss of voltage stability.
- Bus participation factors for each mode that identify areas close to voltage instability.

CYMVSTAB has the unique feature that for both PV and VQ approaches, the modal analysis is applied at each operating point to determine the voltage stability critical areas by identifying the ten buses contributing most to each identified mode of operation.

CYME INTERNATIONAL T&D

Canada & International
1485 Roberval, Suite 104
St-Bruno, QC Canada J3V 3P8
Tel. (450) 461-3655
Fax (450) 461-0966

U.S.A.
67, South Bedford St, Suite 201 East
Burlington, MA 01803-5177 USA
Tel (781) 229-0269
Fax (781) 229-2336

U.S.A. & Canada
1-800-361-3627

www.cyme.com
info@cyme.com