

Announcing the ultimate voltage stability tool:

QuickStab[®] Advanced

- ✓ *Look-ahead dynamic contingency assessment*
- ✓ *New maximum loadability analysis options*
- ✓ *Steady-state stability profiling of load buses, ..., and much, more*

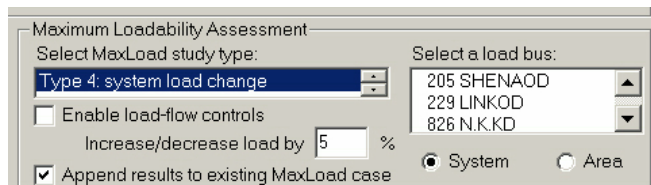
After a long period of fascination with P-V and Q-V curves, the industry realized that voltage stability can't be assessed just with load-flows that neither represent the machines nor check the singularity of the dynamic Jacobian [1], [2], [3]. Exact load-flow calculations are obviously needed to determine the post-contingency state and model load and generation changes -- but the stability assessment *per se* has to be relegated to specialized stability tools specifically designed for this purpose.

For example, when QuickStab[®] performs dynamic contingency assessment, each case entails: first, a full Newton-Raphson load-flow, which computes the post-contingency state; followed by stability calculations, which identify the limit where voltages collapse and units lose synchronism. For the comparison of the base and contingency state results to be consistent, the base case, which may come from a state estimate or from an external load-flow computation, is recalculated as well. This field-proven

approach is fast and accurate [4], works flawlessly, and is currently being used 24/7 in control centers in the United States, Europe and Asia.

MaxLoad Analysis

Due to the success of this methodology, we are now using it to assess *what-if* scenarios consisting of load and generation changes that go beyond the usual contingency analysis paradigm. The newly added tool is called QuickStab® MaxLoad Express.



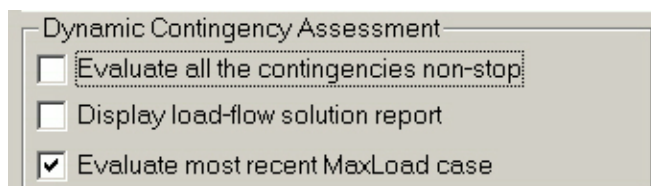
When you select and run the QuickStab® MaxLoad Express computational engine from the QuickStab® Advanced Control Panel (shown on the first page), you are provided the ability to evaluate events where the load can be increased or decreased at:

- User-selected load buses
- The load buses specified in a user-provided list
- All the load buses within user specified areas or in the entire system.

The amount of load change is entered in % of the current value of the load at the user-specified bus, area(s) or system. The power factor from the base case is maintained constant. The generated MW are rescheduled within the area(s) where the load has changed, similarly to the Automatic Generation Control procedure, or within user-specified area(s), thus making it possible to simulate market transactions where a load increase in one area is compensated by raising the generation somewhere else.

Look-Ahead Dynamic Contingency Analysis

This is an exciting new feature that allows you to perform dynamic contingency analysis not only for the current case, but for postulated cases as well, e.g., look-ahead load increase/decrease scenarios.

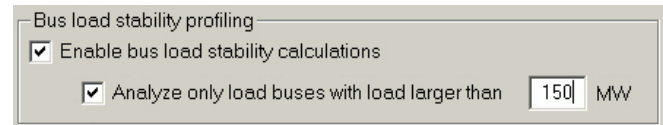


For example, you can: start by assessing the operating reliability of a given system state assuming a range of single and multiple contingencies; then, evaluate the risk of blackout if the system load and MW transfers would change in some significant way; and, finally, run

again the dynamic contingency calculations on the new postulated system state. It's cool, it's fast, and it's easily done just by a couple of point-and-clicks.

Bus Load Stability Profiling

The earlier capability to evaluate individual load buses rather than the entire system has also been upgraded.



For the load buses you have specified or for all the loads larger than a MW threshold, a "stability profile" is created by:

- Ranking the buses in the order of their steady-state stability indices, and
- Visualizing how the generators "are seen" at each of the load buses selected for analysis.

Study Mode and Real-Time

The MaxLoad analysis and bus load profiling calculations are best suited for study-mode, but the Real-Time QuickStab® Extensions allow you to schedule their periodic execution as well. The results can be posted on automatically updated displays or examined with tools such as the QuickStab® Viewer.

Contact Us

QuickStab® stands out in the industry because of its computational speed, user-friendly interface and ease of integration with new or existing SCADA/EMS systems. For additional information please visit <http://www.eciqs.com> or contact us by phone (212) 913-9154, e-mail infoqs@eciqs.com or in writing: Energy Consulting International, Inc., 405 Lexington Avenue 26th Floor, New York, NY 10174.

References

- [1] Sauer, P. W., Pai, M.A., 1990, "Power system steady-state stability and the load-flow Jacobian", IEEE Transactions on Power Systems, 5, 4, November 1990, pp. 1374-1383
- [2] Sauer, P. W., M.A. Pai, "Relationships between power system dynamic equilibrium, load-flow, and operating point stability", in *Real Time Stability in Power Systems*, pp. 1-30, Springer Verlag, Norwell, MA, 2006
- [3] Vournas, C. D., Sauer P. W. and Pai, M. A., 1996, "Relationships between voltage and angle stability of power systems", Electrical Power and Energy Systems, 18, 8, pp. 493-500, Elsevier Science Ltd
- [4] Molina Mylius, R. D., Cassano, "Dimo's approach to steady-state stability assessment: methodology overview and algorithm validation", in *Real-Time Stability Assessment in Modern Power System Control Centers*, pp. 320-353, John Wiley & Sons and IEEE Press, New York, NY, USA, 2009
- [5] **** "Announcing the Real-Time QuickStab® Extensions", ECI Newsletter Vol. 5, No. 2, August 2007