CYME
Power Engineering Software and Solutions

Network Disturbance Assessment D-A-CH-CZ

Determine the effects of generation units and non-linear loads on power quality

The increasing amount of power electronics, non-linear loads and distributed generation installed on the electrical network can adversely impact power quality by causing unacceptable voltages levels and unbalances, harmonic distortion and flicker levels.

The CYME Network Disturbance Assessment D-A-CH-CZ module allows quickly determining the acceptability of a new load or generator interconnection by evaluating its impact on a series of power quality criteria.

On top of the interconnection of non-linear loads to the grid, the broadening of the distributed generation panorama and power electronics applications has increased the probability, frequency and severity of power quality issues such as over- and under-voltages, harmonic distortion, flicker and voltage unbalance on the power system.

Since these events can affect utility's customers in several ways ranging from discomfort to safety of persons, equipment malfunction, damage and/or overheat, processes disruption and data loss, an adequate evaluation of the impact of an installation prior to its interconnection to the power system is necessary.

In accordance with the standard *D-A-CH-CZ – Technical Rules for the Assessment of Network Disturbances*, the CYME Network Disturbance Assessment D-A-CH-CZ module quantifies and evaluates various voltage quality perturbations introduced by an equipment through a series of tests.

The module uses CYME's robust load flow and short-circuit simulations to evaluate voltage variations and rise, flicker levels and harmonic distortion to help in determining if the interconnection of a load or generator is acceptable or not, according to a series of adjustable limits.

The module produces a simple report indicating, for the installation analyzed, whether its operation is recommended or not, based on the outcome of the verifications performed. An intuitive color-coding function of the pass or fail status of each test is also used to draw attention on the unacceptable situations.

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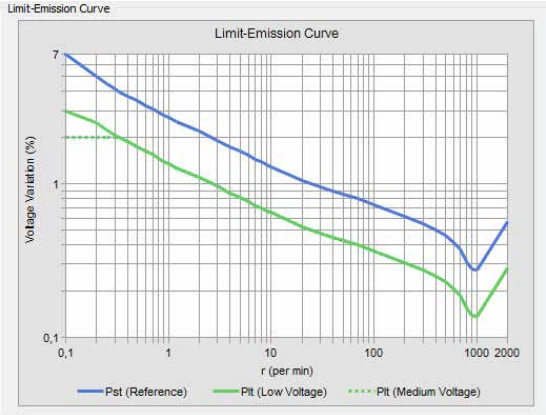
Determine the effects of generation units and non-linear loads on power quality

The assessment, performed according to the standard *D-A-CH-CZ – Technical Rules for the Assessment of Network Disturbances*, can be done for new or existing installations.

The following loads and DER types are supported:

- Spot load
- Induction motor
- Electronically coupled generator
- Photovoltaic system
- Wind Energy Conversion System (WECS)
- Solid Oxide Fuel Cell (SOFC)
- Micro-turbine
- Induction generator
- Synchronous generator



Verifications

The module executes the following verifications to determine if the installation has a negative impact on the power quality of the system. Different acceptability limits can be defined for low-voltage and medium-voltage systems.

- **Voltage variation limits** – An installation can disturb the network by being used at different intensities, the worst case being when it is switched on and off from full power. This validation checks if the worst system voltage variation exceeds the limit set by the user for the frequency of changes defined.
- **Flicker constraint** – Rapid and constant voltage fluctuations on the network can cause perceptible variations in light intensity. This quick and repeated change is called flicker and can be uncomfortable to the human eye. This validation evaluates the short-term (Pst) and long-term flicker (Plt) and compares the values to a standardized limit-emission curve (IEC 61000-3-7©).
- **Harmonic constraint** – The total harmonic distortion of the installation is calculated and compared to the standard admissible value based on the context. A user-defined harmonic spectrum can be specified when inverter-based generation is studied.
- **Voltage rise** – For generation units, a voltage rise check is performed to ensure the voltage at any point on the network does not rise beyond the percentage set by the user.

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