

Paris Session 2022



An optimistic view for harmonic instabilities in the future

B4 – DC systems and power electronics

PS1- 4 Harmonics and Filtering and Interference in HVDC Applications

Question: 1.7

- With large integration of PE equipment to the grid will the industry observe more stability issues and in the worst case more blackouts?

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There are different tools available to address and analyse the interaction issues for VSC HVDC related technologies:

- 1) Offline Root Mean Square (RMS) simulation,
- 2) Electro-Magnetic Transients (EMT) simulation,
- 3) Small Signal Analysis
- 4) Control hardware in the loop with real time simulators.

A variety of factors increase the likelihood of interaction phenomena:

1. Several difficulties involving the inappropriate use of analysis tools and model types
2. A lack of well-defined guidelines on modelling needs, processes, and data exchanges for converters and passive grid components related to a certain power system occurrence.
3. Absence of accepted or agreed tools to be used at specific stages of the project life cycle to conduct the necessary studies

Therefore, there is need of a clear recommendation on analysis, modelling and mitigation of interactions between VSC-HVDC converters, other converters, and the AC grid components, through the complete lifetime of the project.

With large integration of PE equipment to the grid will the industry observe more stability issues and in the worst case more blackouts?

An obvious answer is potentially yes, since different controls designs will impact in the harmonic frequency range and might have an asymmetrical impact in the network.

However, the input from the task forces of CIGRE WG 14.29, WG B4.67, WG C4.49, and WG B4.81, making it possible to utilise such guidelines and thoroughly examine system stability to ensure stable, robust and reliable operation.

Therefore, blackouts caused by harmonic issues will be much less common in the future if such guidelines as those listed in the WGs above and the contribution given in paper CIGRE 2022 paper: ID 10112 are used and taken into consideration for new VSC HVDC schemes.

This is because the industry will have a better understanding of the causes of the issues and more proposed standard solutions will be available such as active damping control.