

# Competitive hysteresis controllers - a control concept for inverters having oscillating dc- and ac-side state variables

## Abstract

This paper presents a new control concept for inverters with both dc-side and ac-side filter circuits. As an example the method is applied to a current source inverter (CSI). Oscillations of both filter circuits are actively damped by the proposed control method. The control method enables the use of much smaller filter elements, especially the dc-side inductor, compared with conventional control methods.

The method is composed of two hysteresis controllers, one for controlling the direct current and the other one is a space-vector based hysteresis controller for the ac-side capacitor voltages. When the controlled quantity at the ac- or at the dc- side leaves its hysteresis area, each controller suggests a new switching state, which will force its controlled quantity back into its hysteresis area. But very often these two controllers compete with each other and make different suggestions. Then a compromise has to be found. To arrange such a compromise, each controller assesses all possible switching states of the CSI. Each controller assigns a mark ranging from "6" ("very good") to "1" ("very bad") to each of the possible switching states. Then the marks from the dc-side controller and those from the ac-side are multiplied for each of the 7 possible switching states. The switching state which gains the highest multiplied mark is the optimum compromise and will be realised by the CSI.