

Space-vector-based controller for current-harmonic suppression with a shunt active power filter

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Abstract-

Active power filters are often proposed as flexible solutions to tackle power quality problems in electric distribution systems. It is well known that the need for tracking harmonic currents and voltages with these electronic devices exceeds the capabilities of conventional Proportional+Integral controllers and more sophisticated algorithms are sought. This paper presents a control method based on multiple reference frames for tracking or rejecting periodic signals in this context. The proposed scheme allows recursive calculation when referring signals to reference frames rotating synchronously with harmonic equivalent space vectors whilst only a very small number of trigonometric-function evaluations are required. Furthermore, using the proposed approach, the control of each harmonic can be dealt with using the same simple Integral controller. Experimental results of a shunt active power filter are provided to validate the main contributions of the paper, including an scenario with grid-frequency variation to evaluate the adaptation capability of the proposed controller.

Index Terms- Active filter, Harmonics, Power quality, VSC.

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