Unified Power Quality Conditioner Presentation and Dimensioning

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Abstract : Static converters behave as nonlinear loads that inject harmonic currents into the grid and increase the consumption of the inactive power. On the other hand, the increased use of sensitive equipment requires the application of sinusoidal voltages. As a result, the electrical power quality control has become a major concern in the field of power electronics. In this context, the active power conditioner (UPQC) was developed. It combines both serial and parallel structures; the series filter can protect sensitive loads and compensate for voltage disturbances such as voltage harmonics, voltage dips or flicker when the shunt filter compensates for current disturbances such as current harmonics, reactive currents and imbalance. This double feature is that it is one of the most appropriate devices. Calculating parameters is an important step and in the same time it's not easy for that reason several researchers based on trial and error method for calculating parameters but this method is not easy for beginners researchers especially what about the controller's parameters, for that reason this paper gives a mathematical way to calculate of almost all of UPQC parameters away from trial and error method. This paper gives also a new approach for calculating of PI regulators parameters for purpose to have a stable UPQC able to compensate for disturbances acting on the waveform of line voltage and load current in order to improve the electrical power quality.

Keywords : UPQC, Shunt active filer, series active filer, PI controller, PWM control, dual-loop control

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