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This paper presents the comparison among the control algorithms of a three phase, three wire shunt active power filter. The control algorithms are based on: 1.the current's physical components theory; 2 the *p-q* power theory. The active power filter operation under the distorted supply voltage at the point of common coupling condition is considered. The comparison concerns the aspects of: filtering current harmonics, reactive power compensation (defined in the fundamental harmonic domain), supply current balancing and dynamic performance.

The results of the laboratory investigation, using the fast prototyping system dSPACE, are given in the paper. This paper confirms that the current's physical components theory allows developing the control algorithm of shunt active power filter and its practical implementation. The investigation allows the conclusion that this control algorithm enables achieving the supply system current shape close to the sinusoidal, despite shunt active power filter operation under the distorted supply voltage. A sinusoidal supply current cannot be attained by the control algorithm based on the *p-q*power theory without some additional control elements, such as: PLL, signal filters, etc. The experiment also has shown that the control algorithm based on the *p-q*
power theory is easier to implement and less demanding in terms of hardware than the control algorithm based on the current's physical components theory.


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