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FORMATION OF THE COMPENSATING CURRENT OF A THREE-PHASE SHUNT ACTIVE POWER FILTER USING MULTIPLE-RATE SLIDING MODES

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Abstract

It`s studied the control of a three-phase parallel active filter, which is connected to a network in which there is a nonlinear load. This filter consists of a semiconductor voltage inverter, capacitive storage and a single-order RL filter. The object of research was decomposed according to the rate of movement of the dynamic system. The two-dimensional sliding surface is a linear combination of the components of the two-dimensional current error vectors of the RL filter and the two-dimensional variable obtained by introducing the second-order sliding mode into the system, at the occurrence of which this variable becomes equivalent to the first derivative of the current error. This avoided the use of a separate filter for high-frequency modulation components in the measured current. To stabilize the value of DC voltage, a modified double twisting algorithm is used. To confirm the theoretical assumptions, a simulation model is built and the results of digital experiments are analyzed. A comparison of the proposed strategy with traditional PI control according to the criteria of the duration of the transient process and the harmonic distortion coefficient in the current that is consumed from the network is made. References 10, figures 4.

Key words: shunt active power filter, sliding mode, compensating current, sliding manifold, movies decomposition.

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