

The quality of power supply in India is basically deteriorating due to widening gap between demand and supply, inadequate transmission and distribution system and diversity in loads. The successful integration of Renewable Energy Sources (RES) meet the load demand but at the same time increases the severity of power quality (PQ) problems associated with injection of harmonics and interharmonics in power system. The harmonics in power system may lead to many harmful effects including signal interference, circuit breaker failure, equipment overheating malfunctioning of protection and control circuits, etc. Therefore, as a requirement of smart electricity transmission and distribution system, accurate detection, estimation and monitoring of harmonics are very important. Our work proposes one such new model based on Undecimated Wavelet Packet Transform (UWPT) for accurate estimation of harmonics and implemented it on FPGA hardware platform for real-time applications. The major contributions include accurate and fast estimation of harmonics using only one fundamental cycle data in the presence of most frequently occurring disturbances. This work also includes the designing and development of an FPGA based hardware platform for online estimation of harmonics and tested through real test signals generated through multiple laboratory setups.

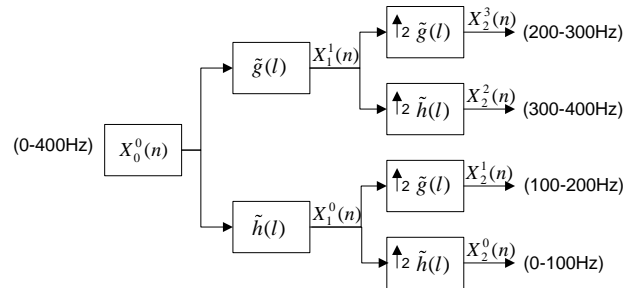


Fig. 1. Two-level UWPT decomposition tree for harmonic decomposition.

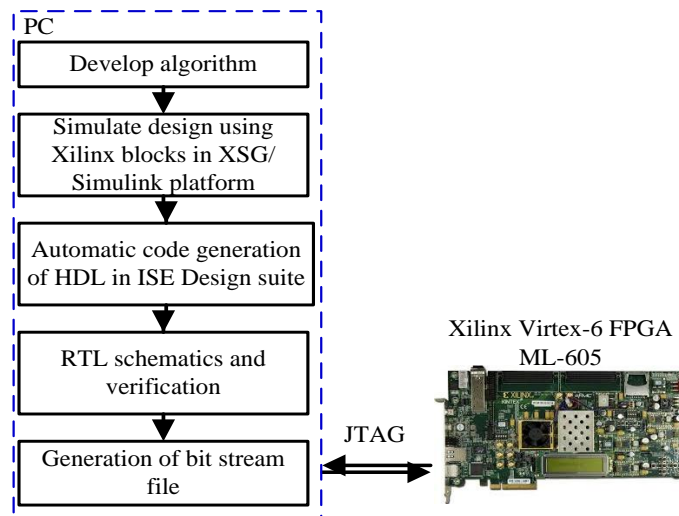


Fig.2. Implementation procedure for real-time harmonics estimation.

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