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Syncretise Use of Smart Meters for Power Quality Monitoring in Emerging Networks

Operation of distribution networks undergoes dramatic changes in the era of smart grid deployment, due to the higher penetration of distributed generation (usually from intermittent resources), to an ever-increased share of power electronics mediated energy transfer, but also thanks to advancements in instrumentation including smart meters (SMs). In this context, alternative power quality (PQ) monitoring and control, based on a lightweight assessment of voltage parameters to be implemented in new SM would allow optimal real-time network operation and market-correlated services. To this, the authors propose a signal analysis framework for simplified PQ informative assessment method using the so-called instrumentation values available in most of today's SM. It is highlighted that the voltage characteristics made available with high reporting rates can be efficiently used in deriving information on quality of the electricity supplied by public electricity networks. Further applications like smart grid synch-SCADA observability and voltage control are also addressed in a novel design of SM, with negligible impact on cost.