

LPIT Frequency Response for Quality Metering

A3 – PS3 – Q18 – One argument ...
wideband characteristic ... What is the
expected frequency response behaviour of
the voltage and current part?

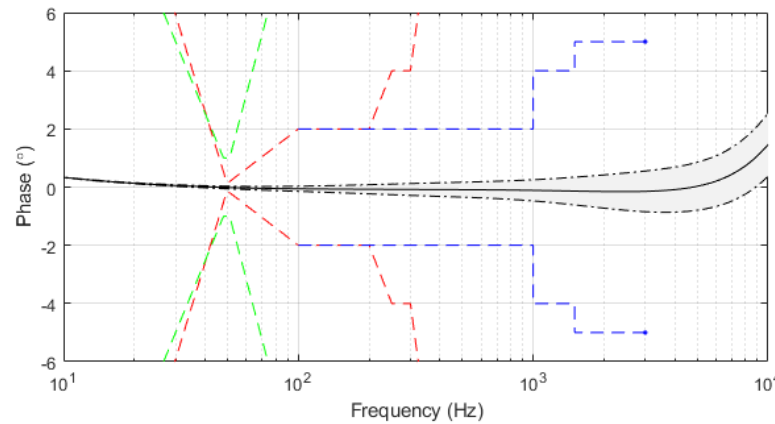
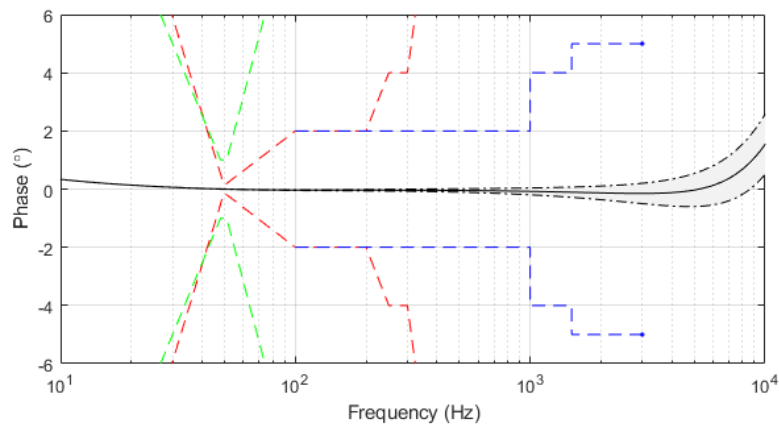
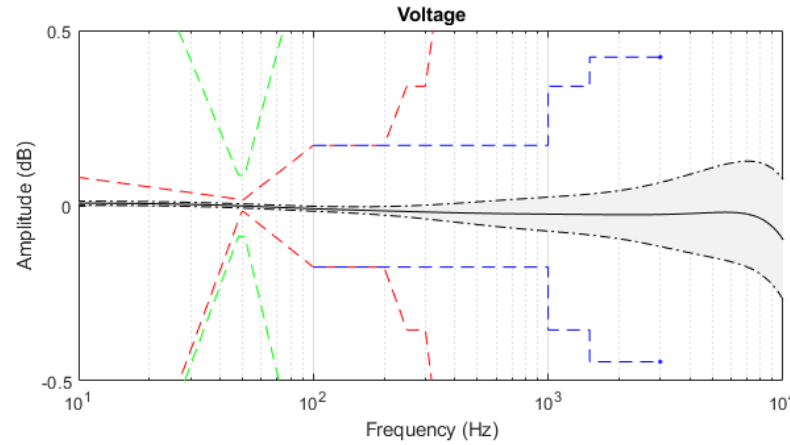
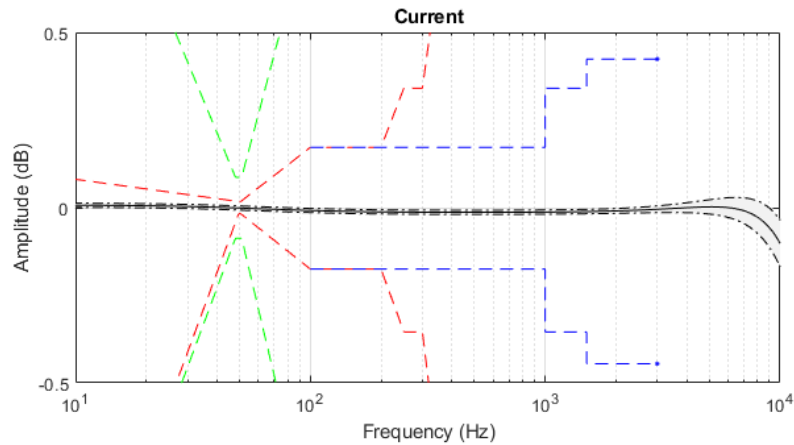
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LPIT Frequency Response for Quality Metering

- Compared to conventional instrument transformers, LPIT provides remarkable linearity, no saturation, no ferro-resonance effects, and **wide frequency bandwidth**.
- LPIT primary sensor (Rogowski coil and capacitive divider) can be well modelled by simple equivalent circuits with well-defined frequency responses.
- Key sensor parameters can be accurately measured and calibrated.
- Analog front end circuitry in secondary converter can be precisely characterized.
- Frequency responses of digital signal processing modules can be easily computed.
- Monte Carlo simulations can be made to assess frequency response stability with all sorts of system variations such as component tolerances.
- By proper design of front-end circuitry, analog & digital filters and other signal processing components, the LPIT system frequency response can be reliably equalized up to many kHz to satisfy power quality metering requirements.

LPIT Frequency Response for Quality Metering



Frequency response of an LPIT for 6kHz (100th harmonic) for power quality metering

- Light gray areas enclosed by dot-dash lines indicate 3σ confidence regions, taking into account all system variations such as component tolerances and environmental conditions
- Blue dash lines represent quality metering requirements (e.g. IEC 61869-6 6A.3)

Conclusion

- GIS LPITs based on Rogowski coils and capacitive field sensors offer a wide bandwidth for power quality metering and travelling wave protection.
- The sensors can be characterized at higher frequencies with appropriate precision.
- Digital signal processing equalizes amplitude and phase response of the signal path.
- LPITs are becoming more versatile and cover metering, protection and power quality metering. They simplify the secondary system.

