

A FRACTIONAL CYCLE DIGITAL FOURIER TRANSFORM PMU APPLIED TO POWER INVERTER EVENT DETECTION

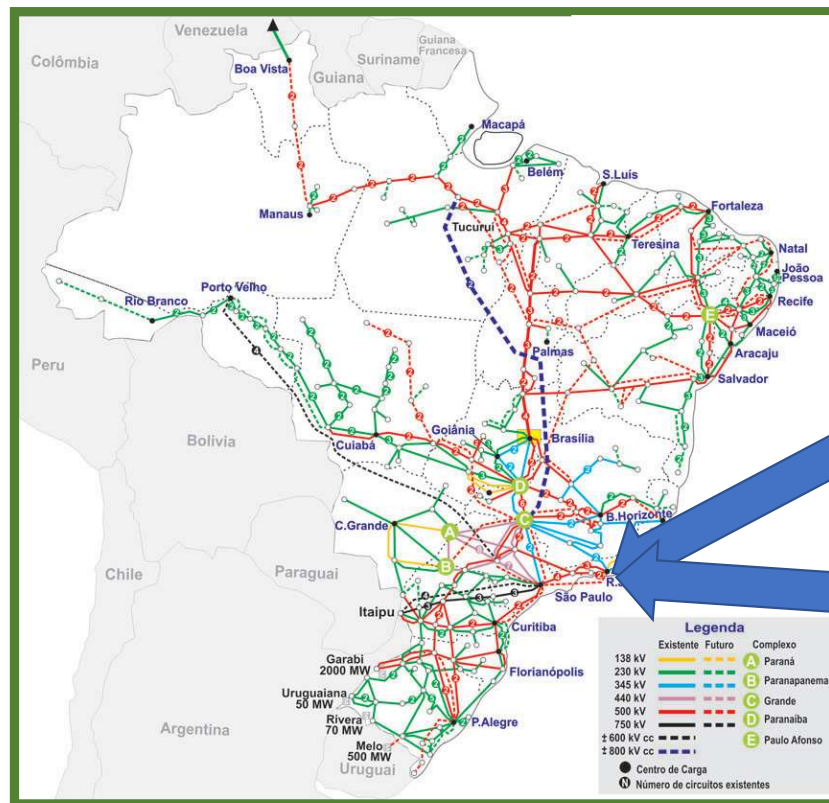
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J. R. Alves (CEPEL), presenter

and G. N. Taranto (COPPE-UFRJ)

LOCATION OF INSTITUTIONS INVOLVED AT THE RESEARCH

BRAZIL



You control what you measure.

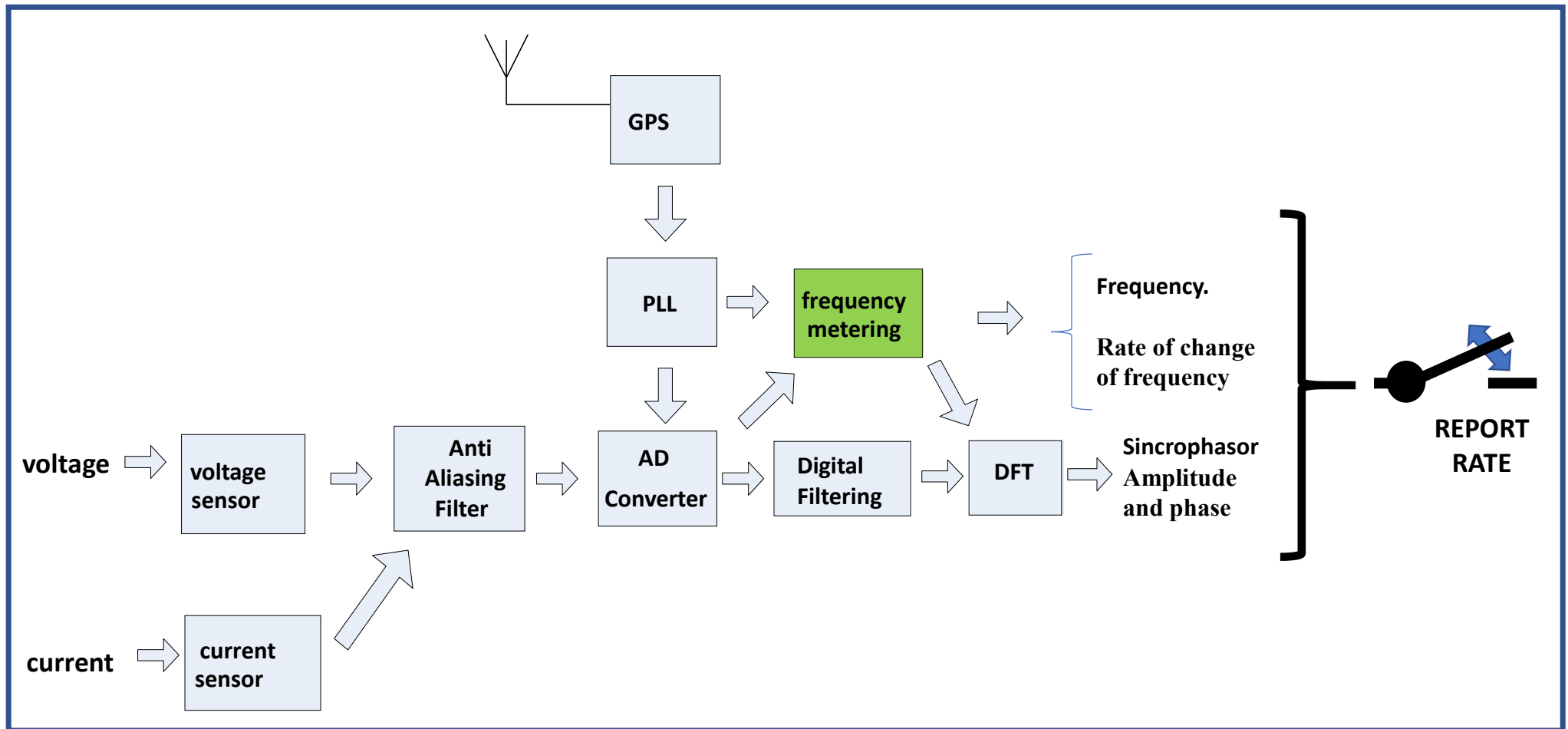
If you measure more precisely and quickly you will control better.

PMUs may provide better measurements in real time and help analysis offline.

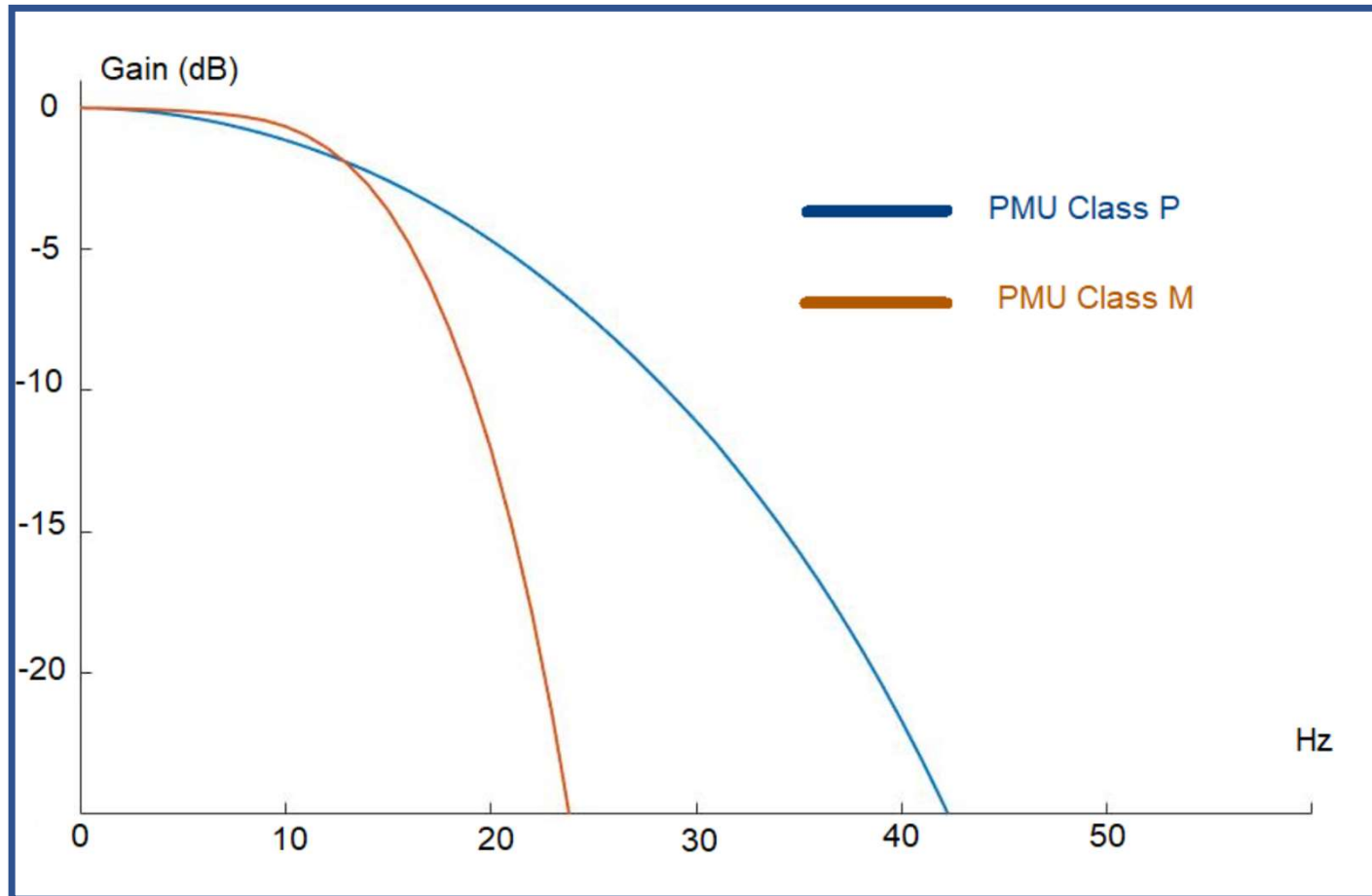
But,

PMUs are enough for fast monitoring and control?

BLOCK DIAGRAM OF PMUs

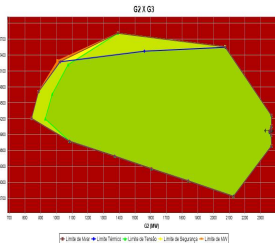


PMU is a DYNAMIC DEVICE



PMU APPLICATIONS

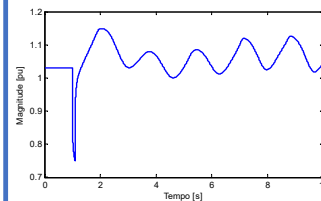
Applications For Systemic Security Assessment



Applications For Energy Management Systems

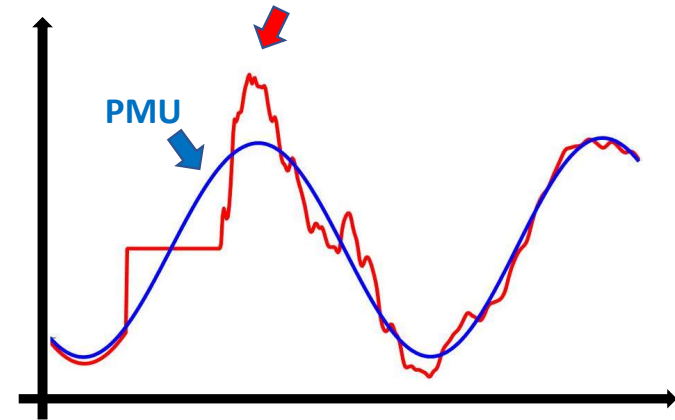


Applications For Dynamic Assessment



Ultra Fast Applications

CONTINUOUS POINT OF WAVE



SAMPLE RATE

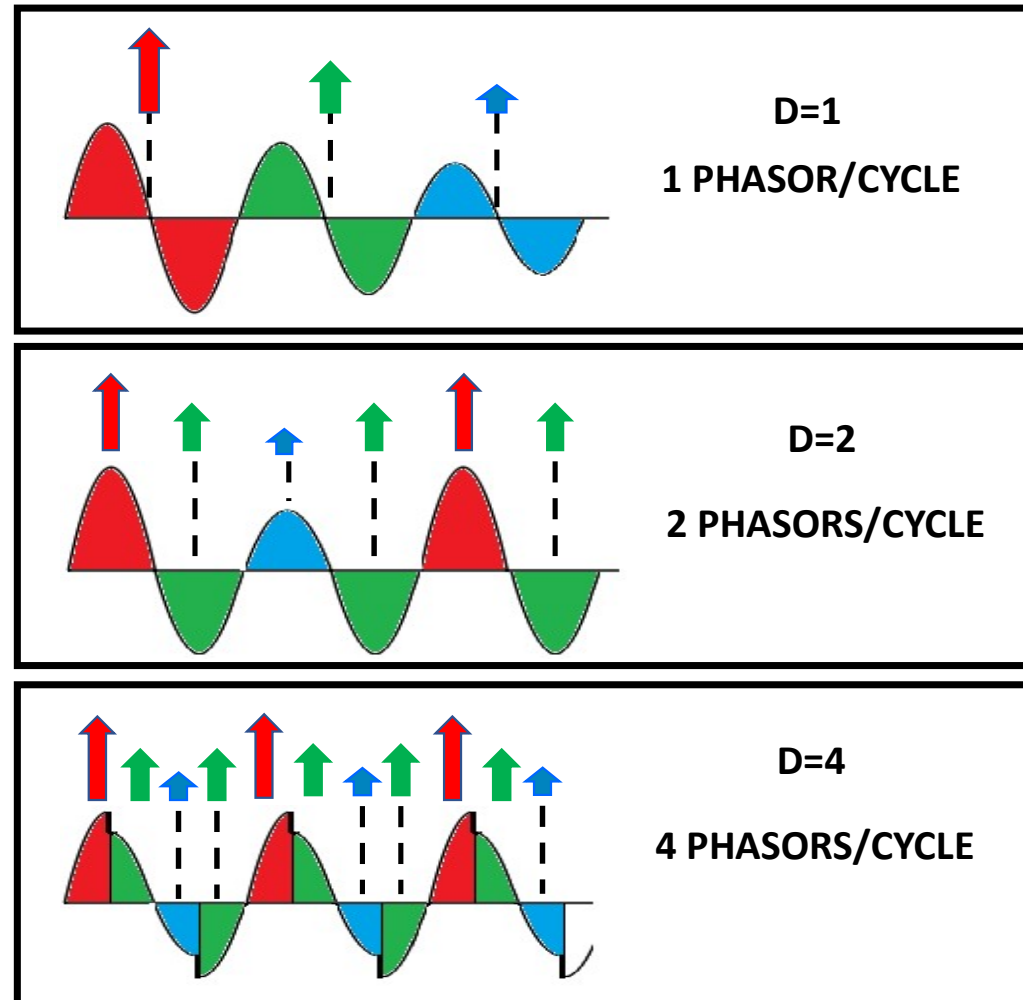
1 PHASOR/MIN

1 PHASOR/SEC

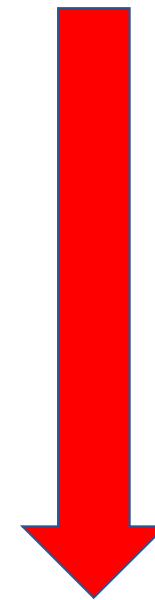
60 PHASORS/SEC

MORE THAN 60 PHASORS/SEC

Fractional Cycle (FC-DFT)

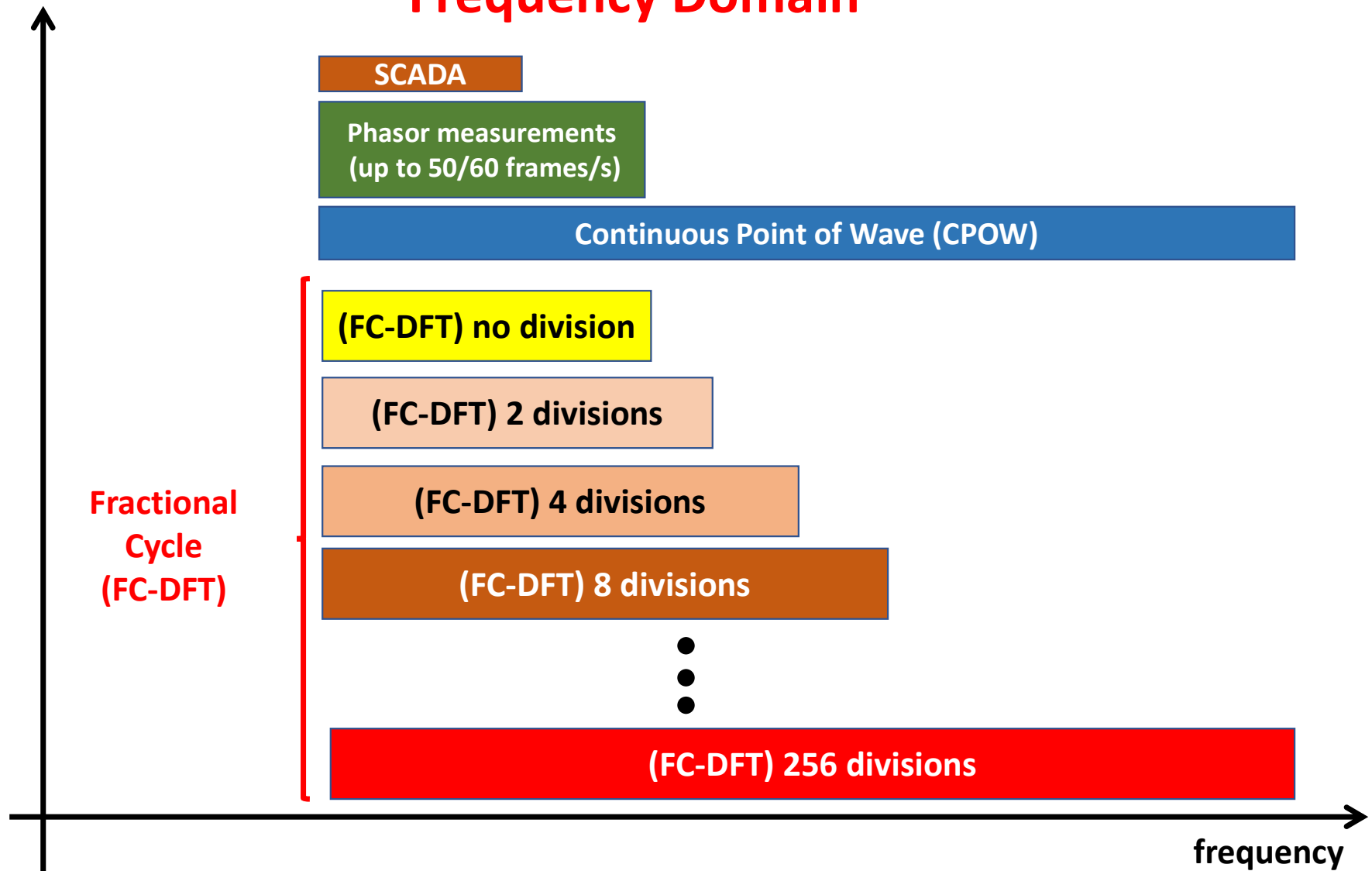


⋮

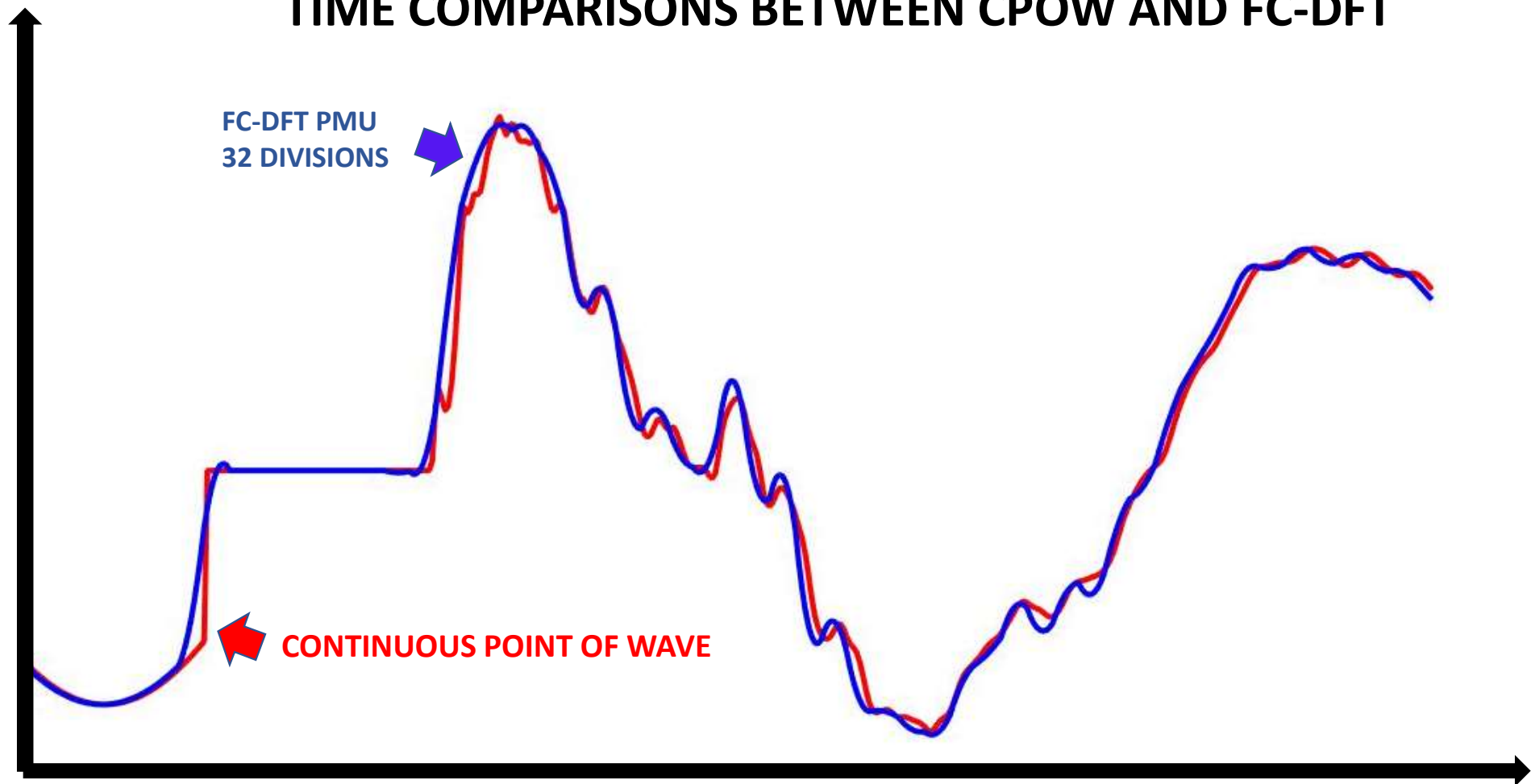


**NUMBER OF
DIVISIONS**

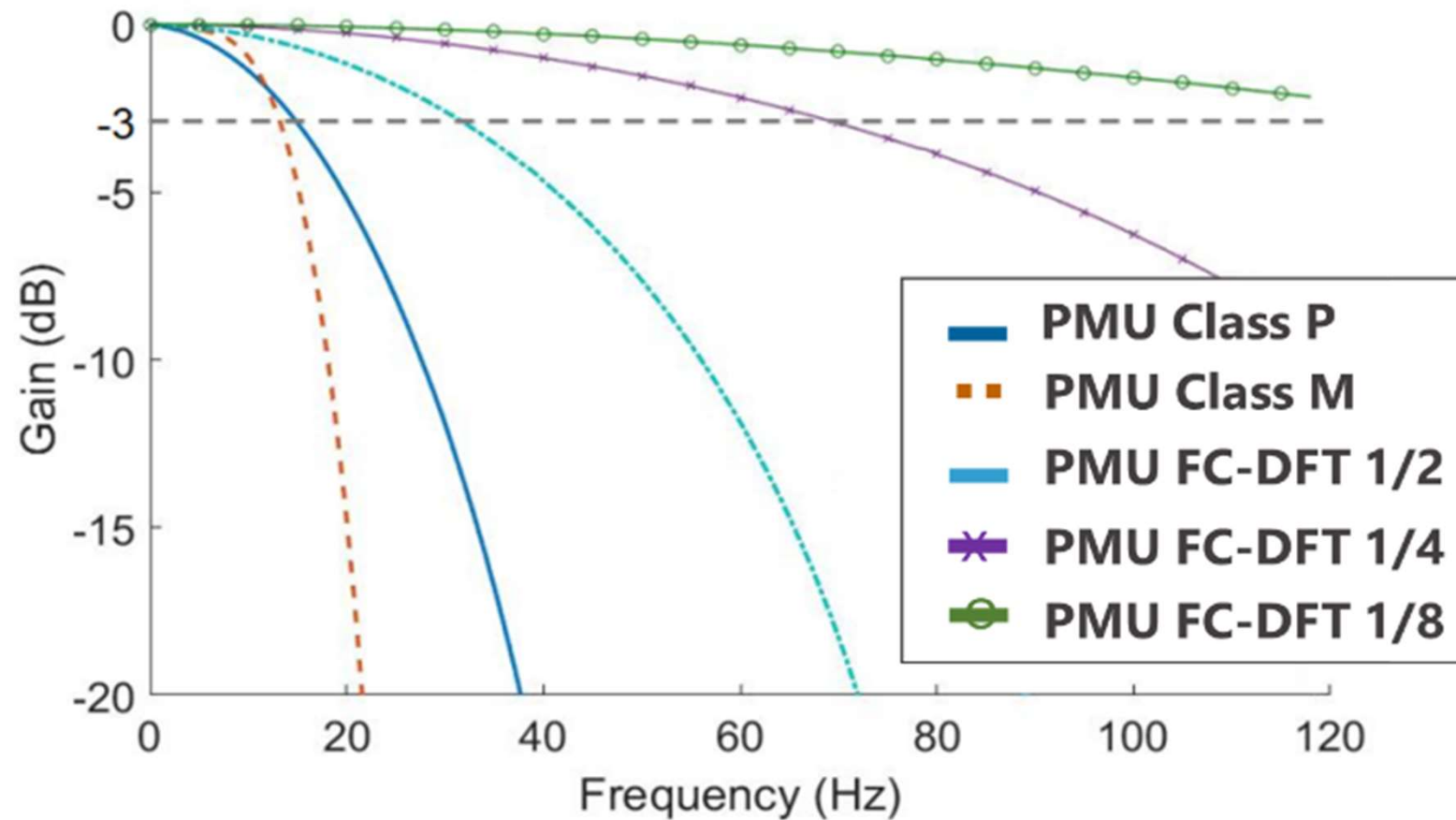
Frequency Domain



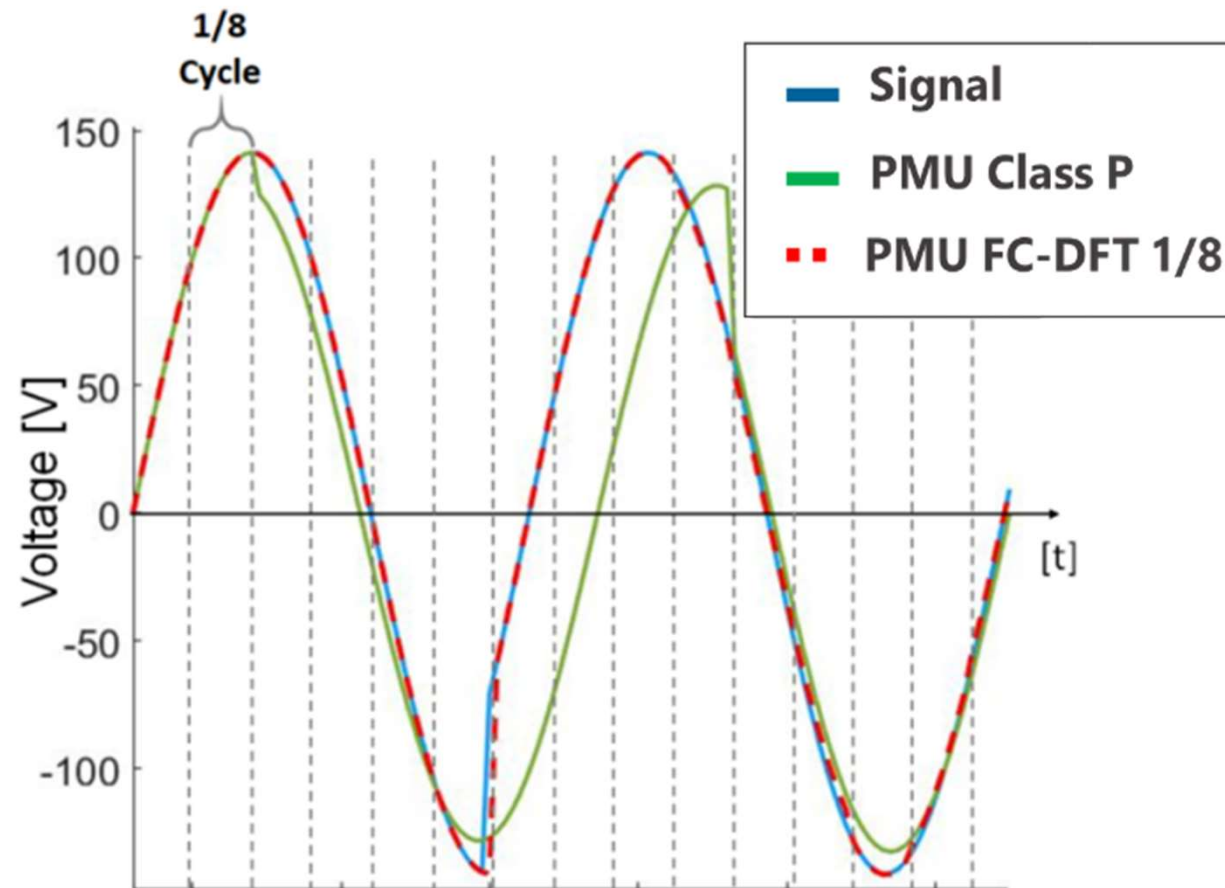
TIME COMPARISONS BETWEEN CPOW AND FC-DFT



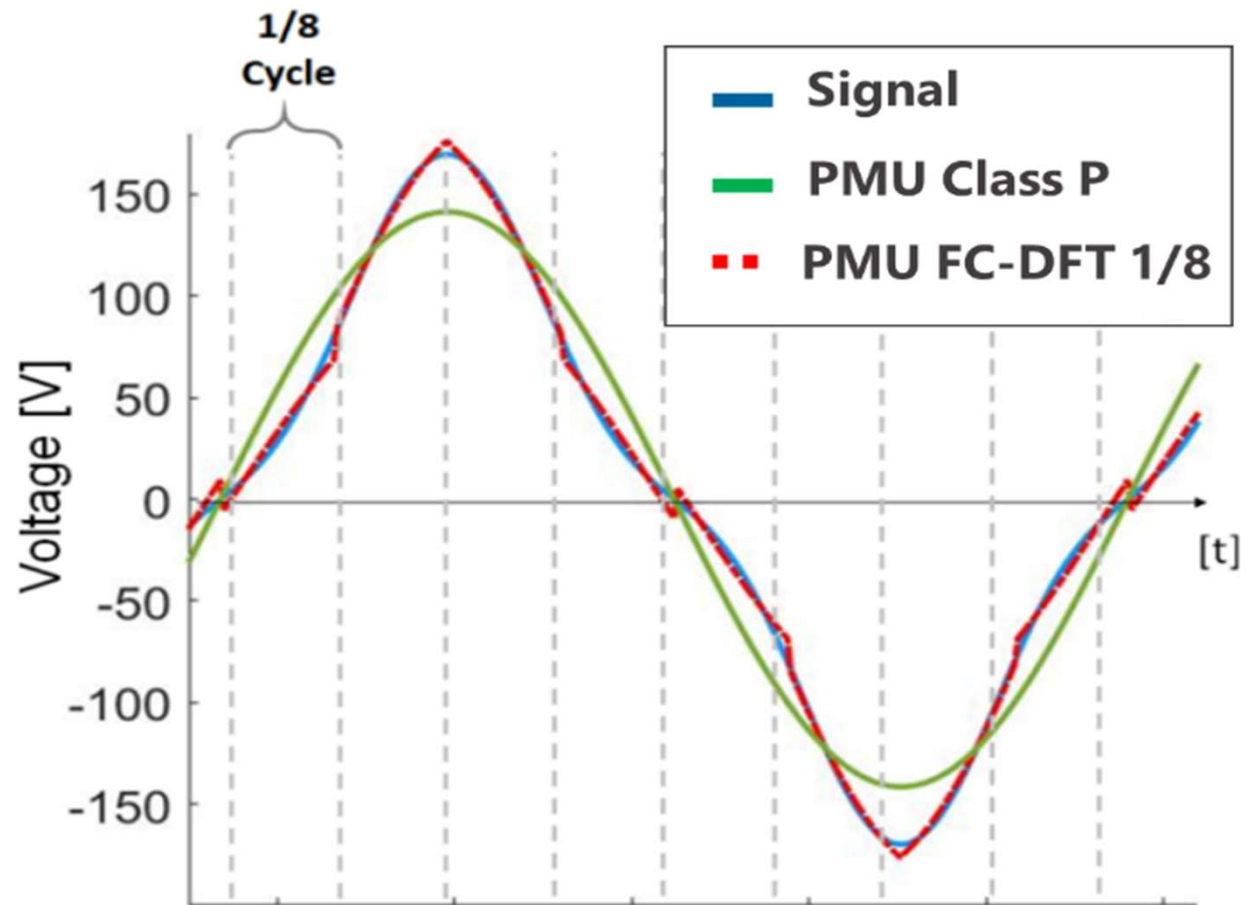
FC-DFT FREQUENCY RESPONSE



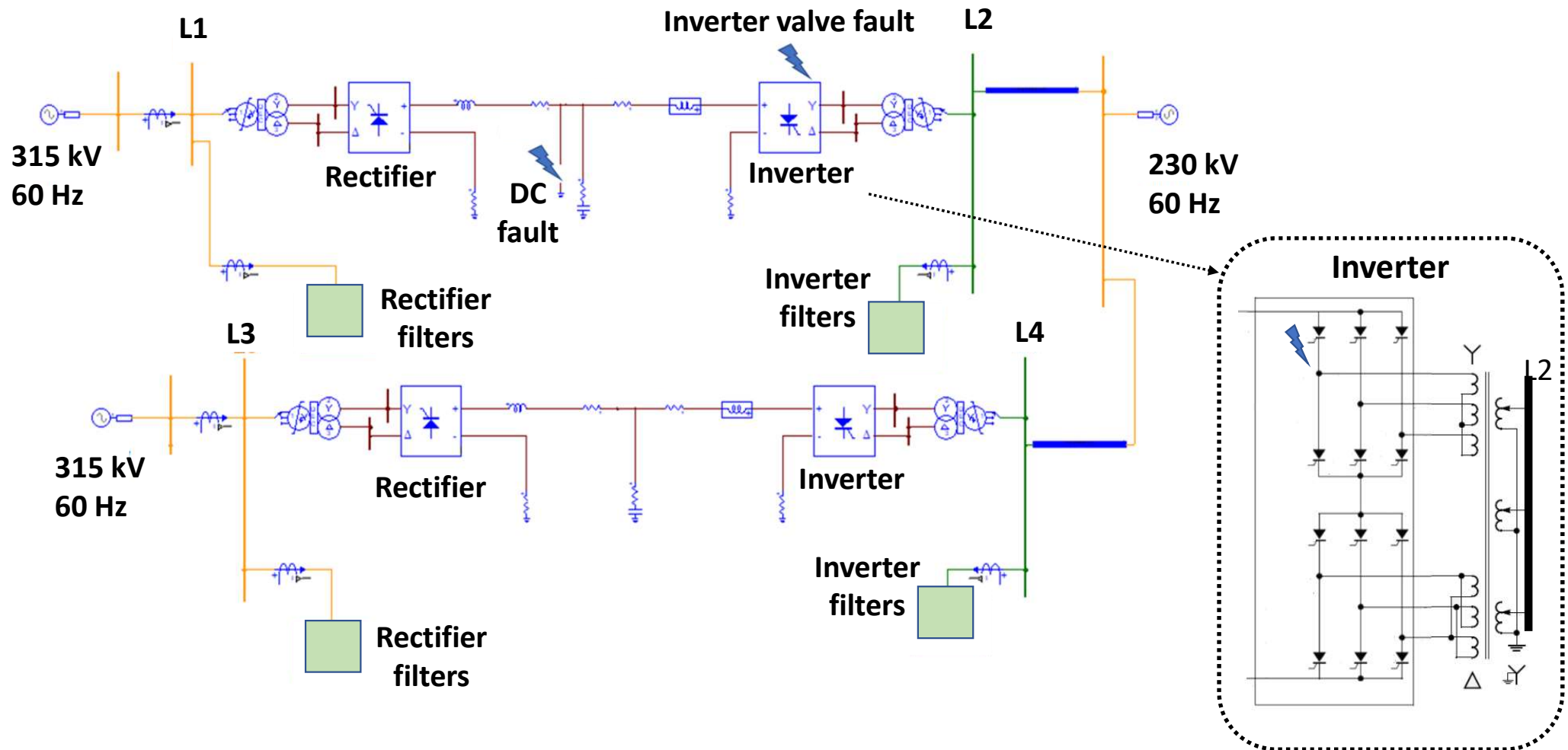
FC-DFT PHASE STEP TRACKING



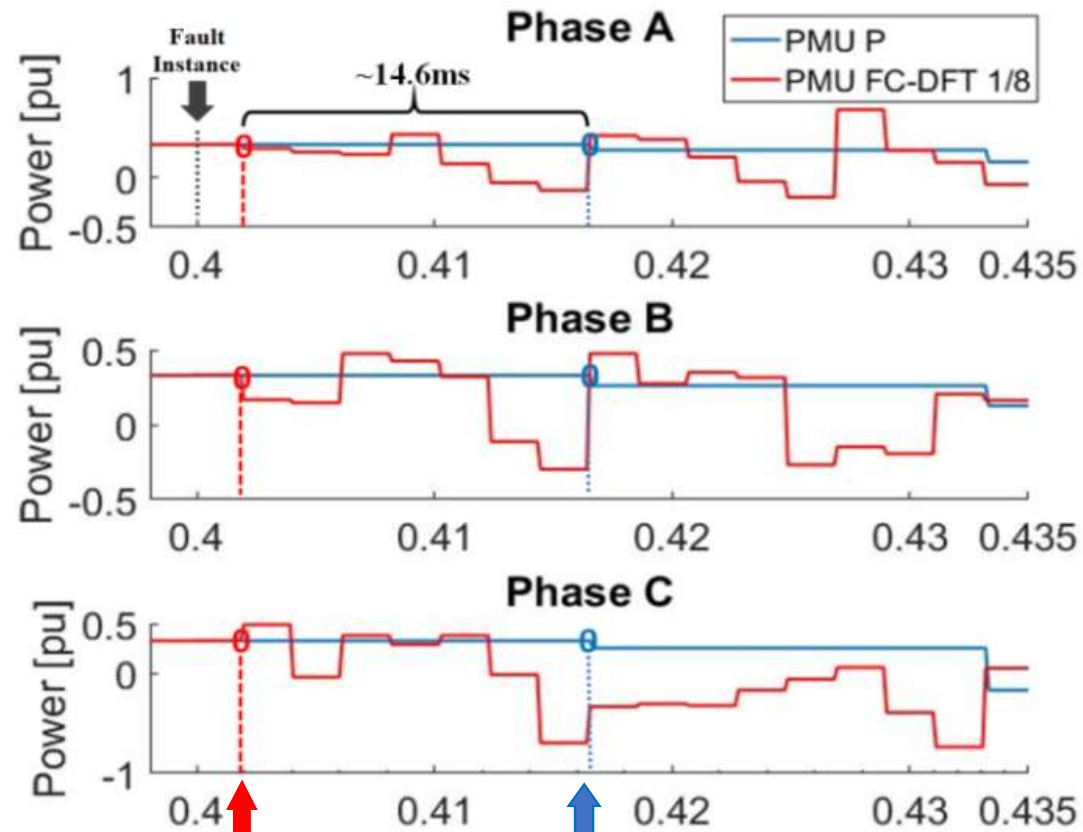
FC-DFT HARMONIC TRACKING



HVDC MULTI-INFEED EXAMPLE



FC-DFT BASED ACTIVE POWER FOR INVERTER VALVE FAULT (L2)



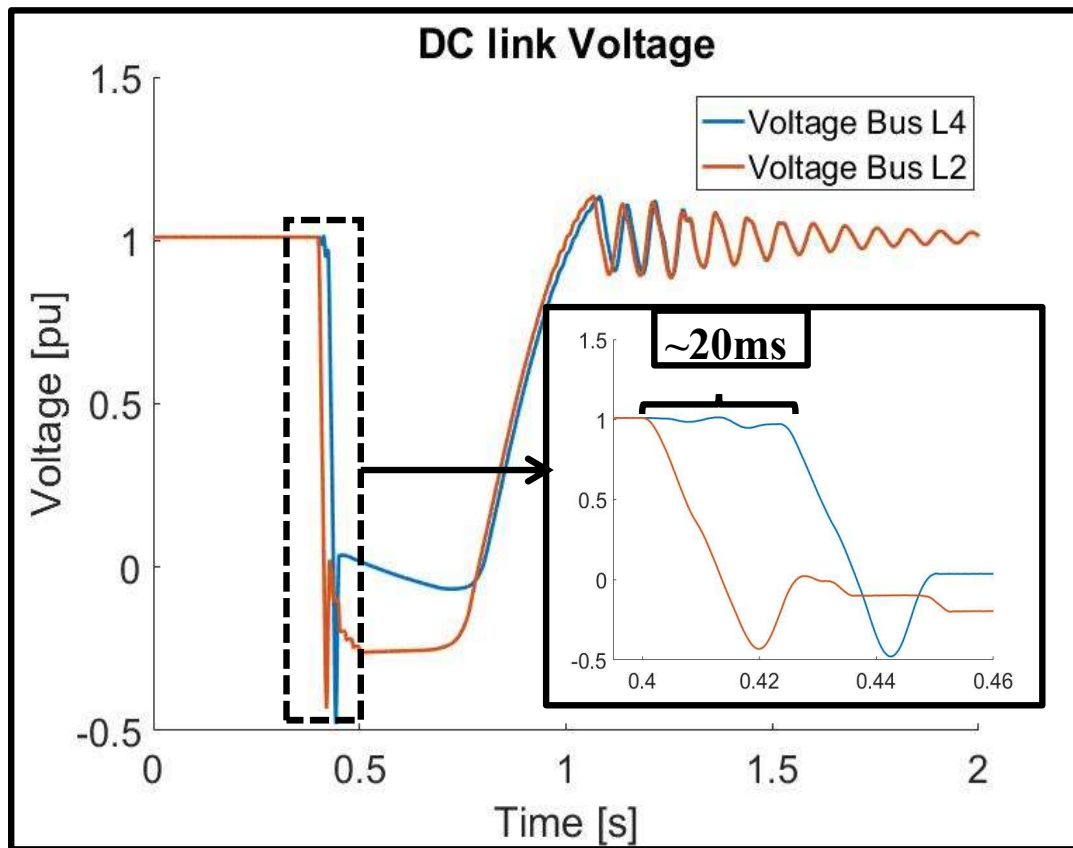
FAULT MOMENT

FC-DFT

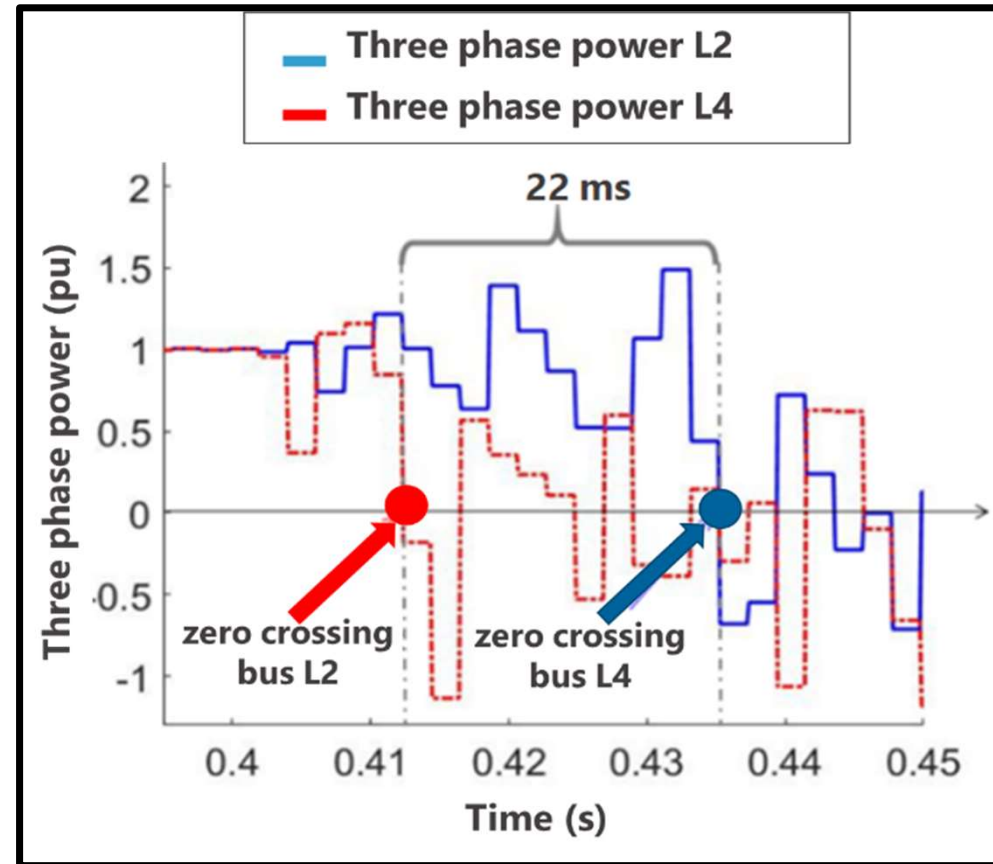
PMU P

INVERTER VALVE FAULT (L2)

HVDC Link DC Voltages

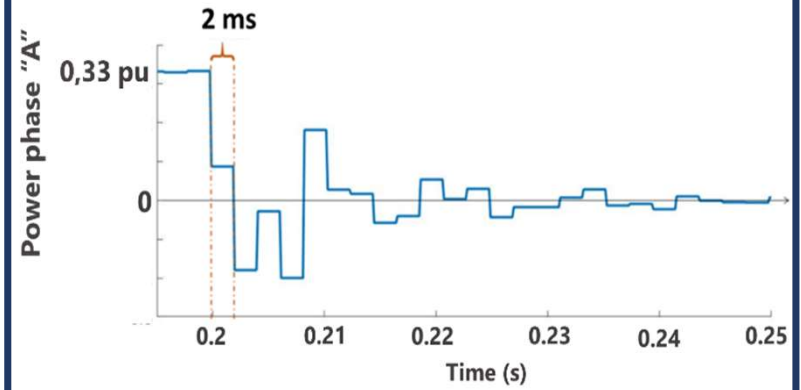
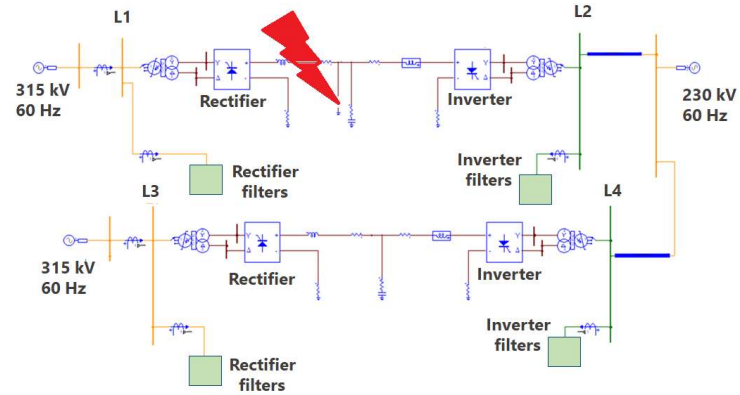


FC-DFT three phase active power

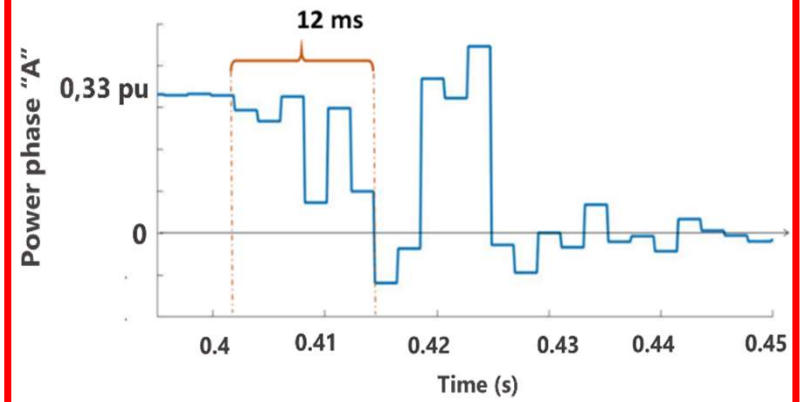
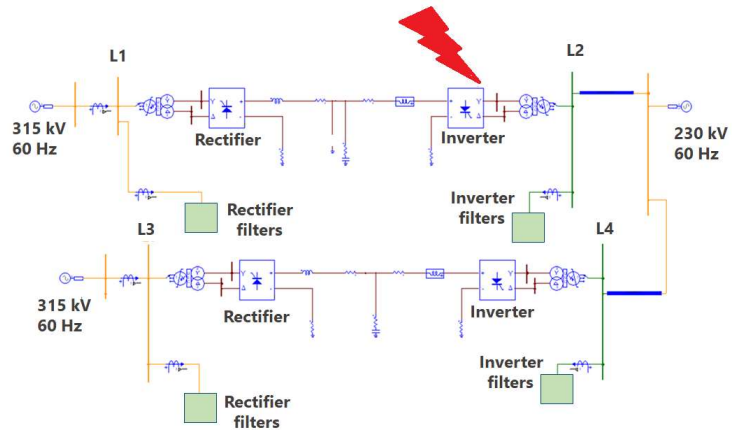


PATTERN RECOGNITION

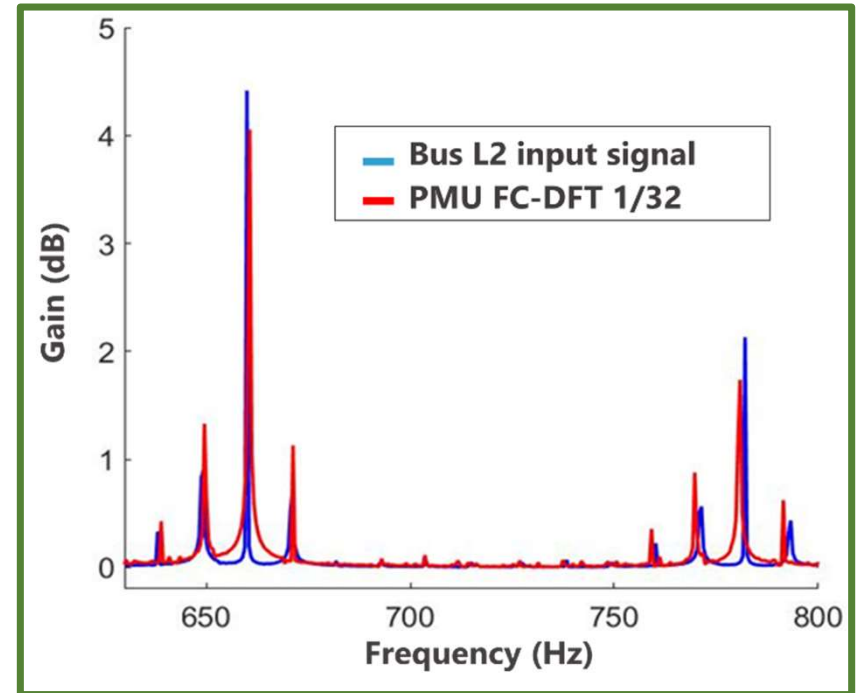
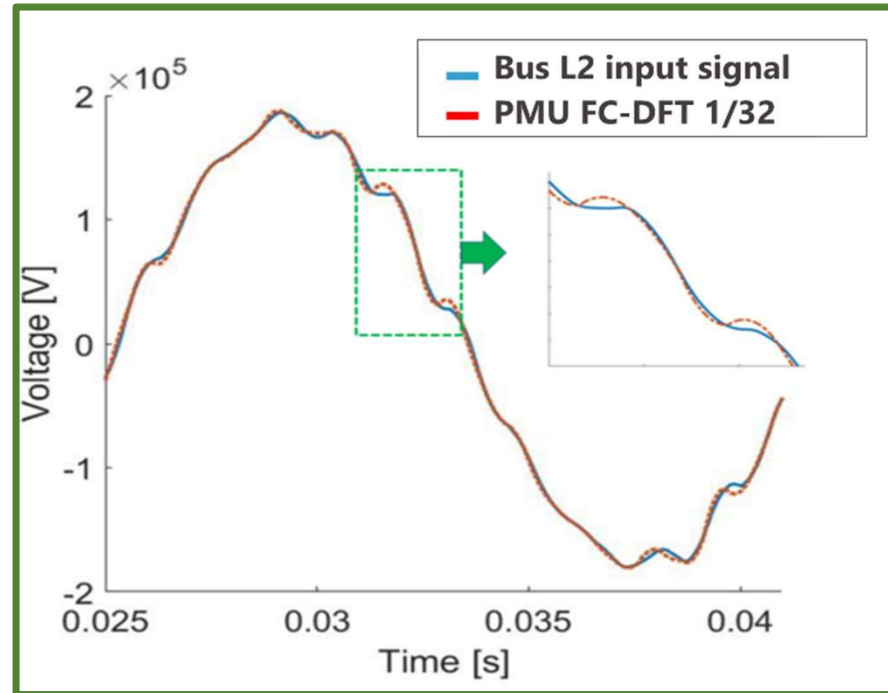
DC FAULT



INVERTER VALVE FAULT

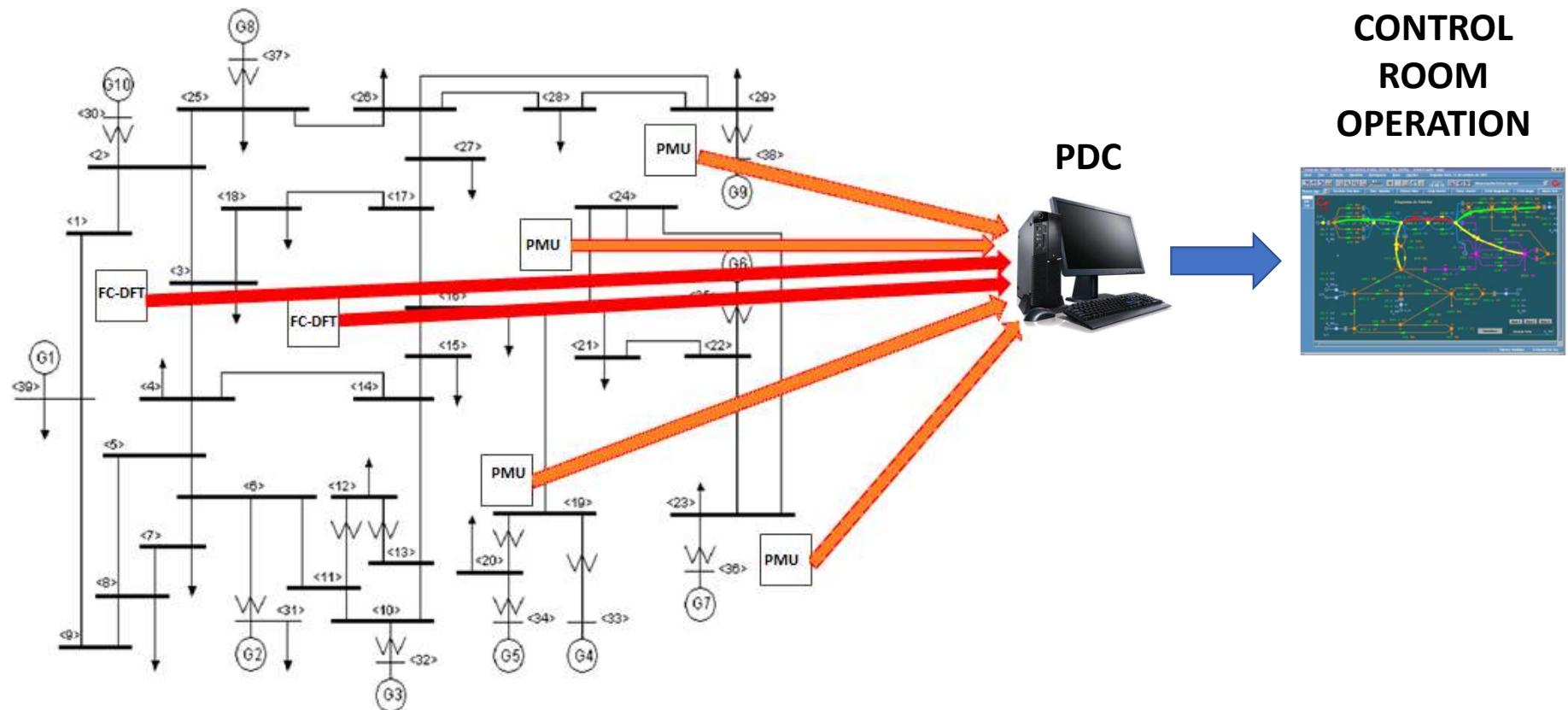


HARMONIC DETECTION



ISSUES

COMMUNICATION BANDWIDTH



ISSUES

MEASUREMENT STANDARDS

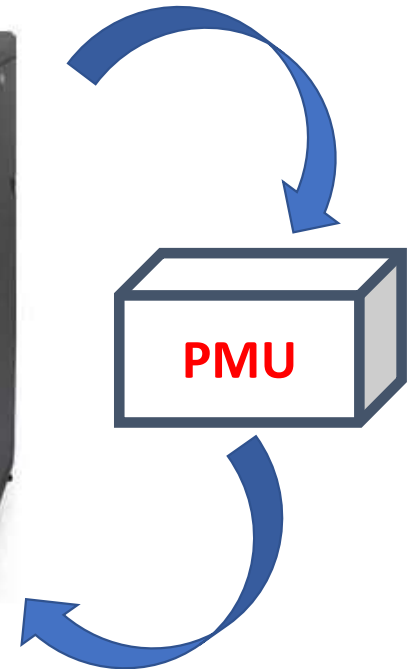
Laboratory for studying Synchrophasor Systems



CALIBRATOR

PMUs

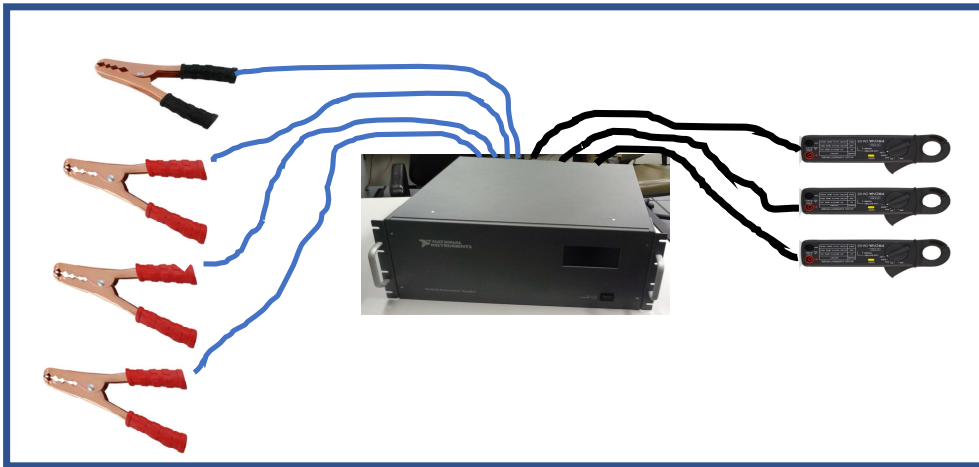
REAL
TIME
SIMULATOR



FUTURE WORKS

DOING PERFORMANCE TESTS

CONSTRUCTION OF A PROTOTYPE

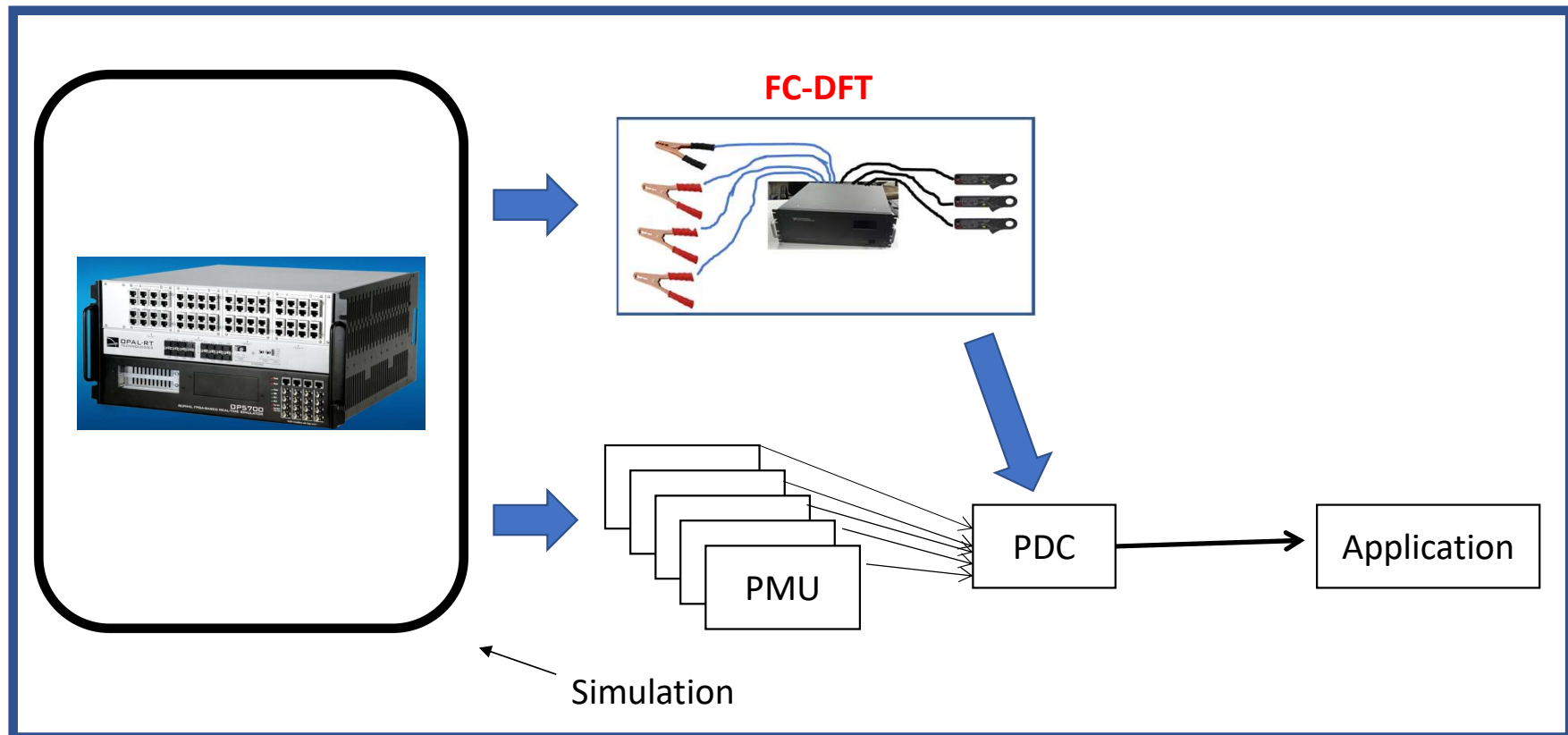


PERFORMANCE TESTS



FUTURE WORKS

DOING REAL TIME SIMULATIONS



THANK YOU!

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