

Model Validation – MOD-026 and MOD-027

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PG&E

Previous WECC Requirement

- Generator model validation required for all generating units > 10 MVA, and all generating plants > 20 MVA
- Test required every five years
- Test required within 180 days for new commercial units or existing units which have been modified

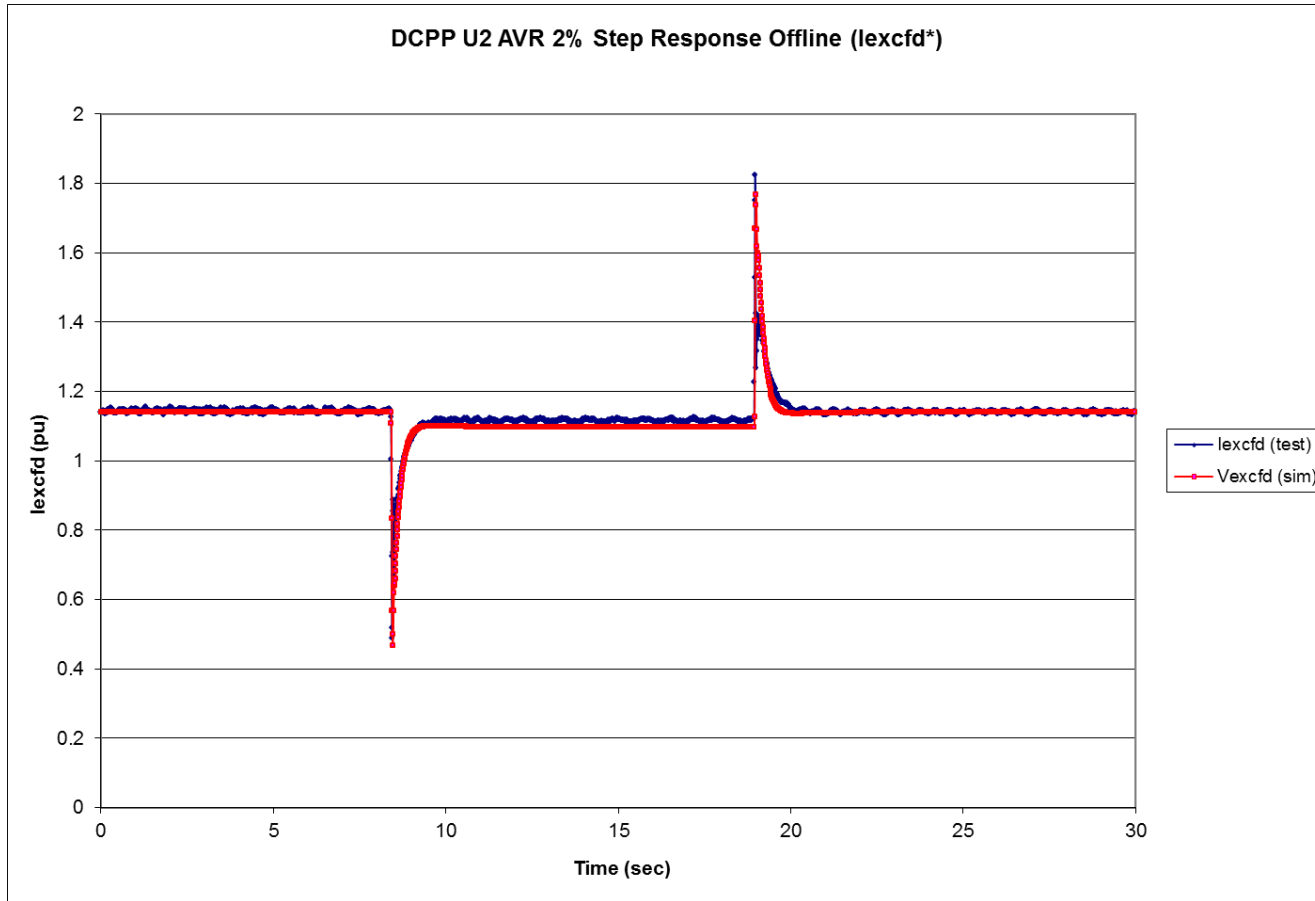
Typical Tests Performed

- Open circuit saturation curve
- Field resistance test
- D-axis dump (generator direct axis reactances and time constants)
- Xq test (generator quadrature axis reactance)
- Inertia trip test
- Governor step tests (on and off-line)
- AVR step tests (on and off-line)
- Min and max Var capability

Diablo Canyon Voltage Regulator Test

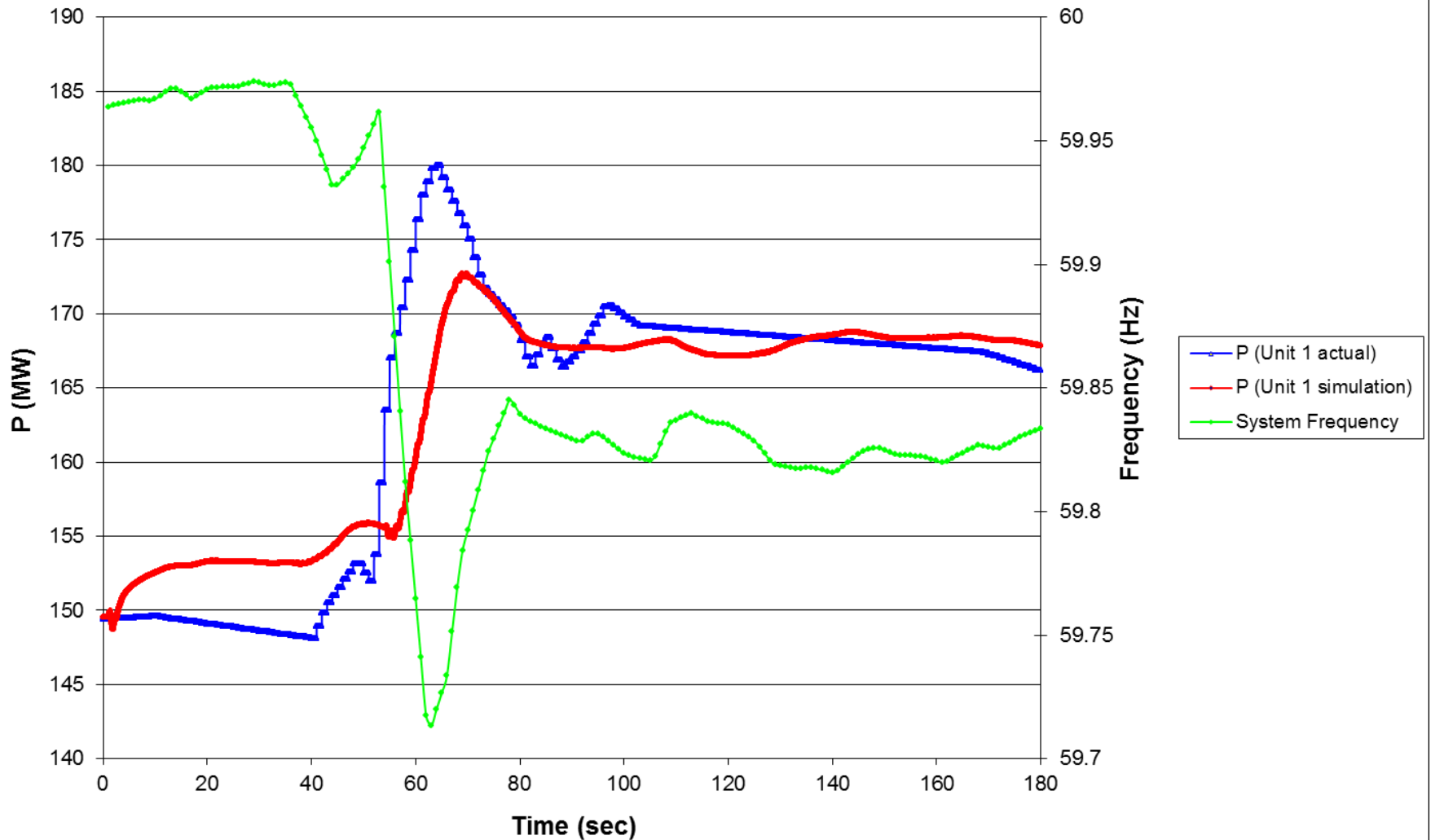


DCPP #2 AVR Step Test

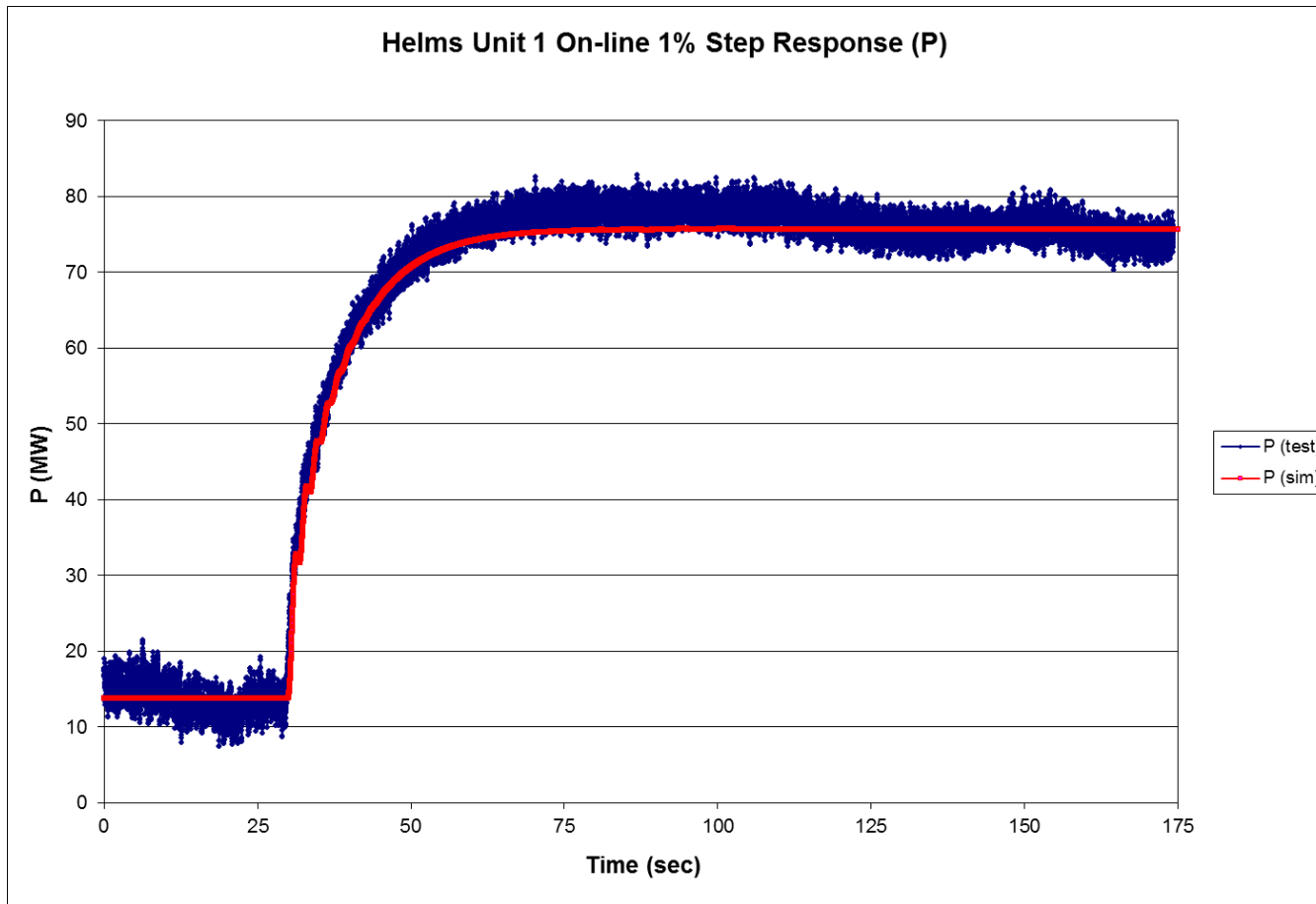


Validating Models to Actual System Response

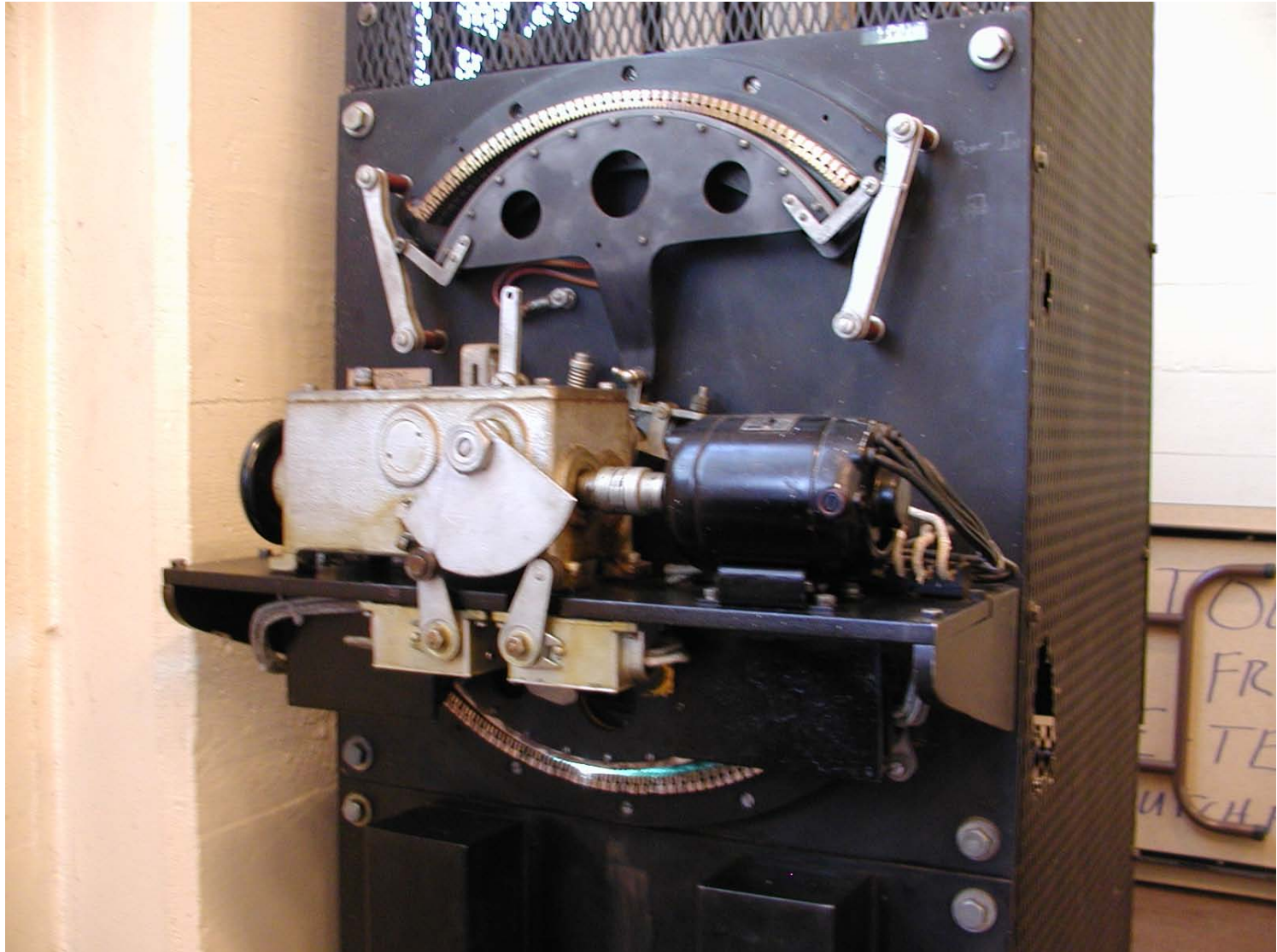
Helms Unit 1 Governor Response to PDCI Trip (6/6/2002)



Helms 1 Governor Step Test



Dutch Flat 1 Excitation Control



JB Black 1 Mechanical Governor

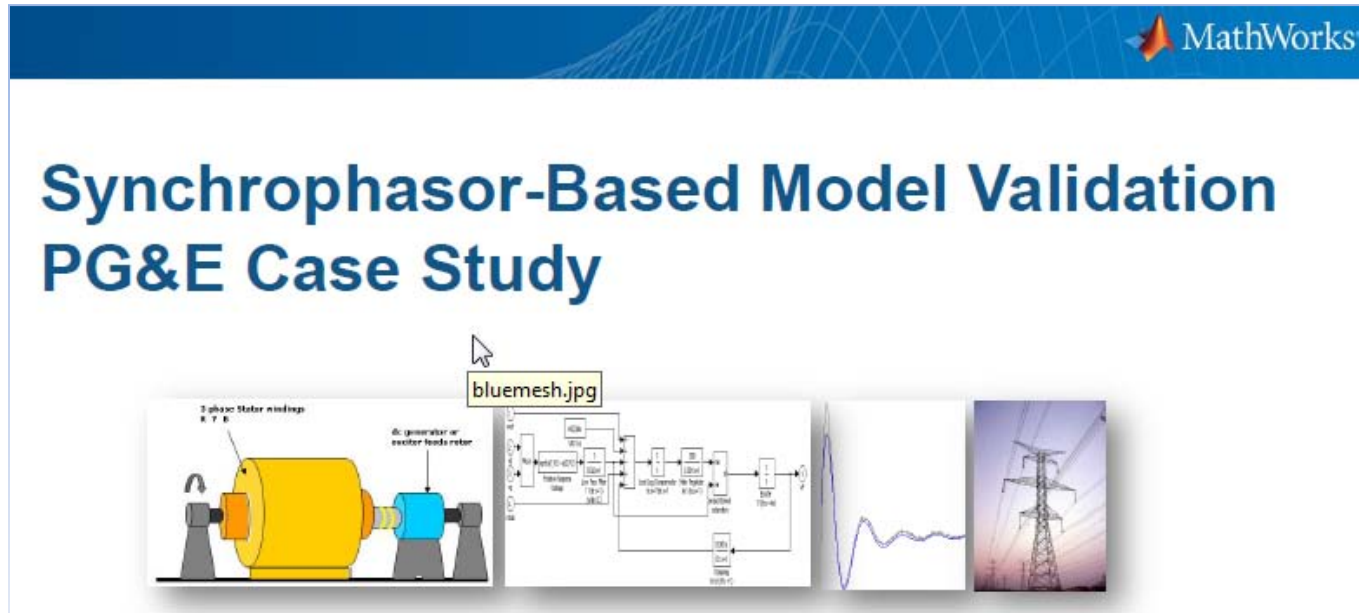


NERC MOD Standards

- MOD-026 – Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions
- MOD-027 – Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions

Parameter Estimation and Model Validation Tools Utilizing PMU Data Under Evaluation

- Mathworks Parameter Estimation and Model Validation Tool



- EPRI Power Plant Parameter Derivation Tool

Questions?

