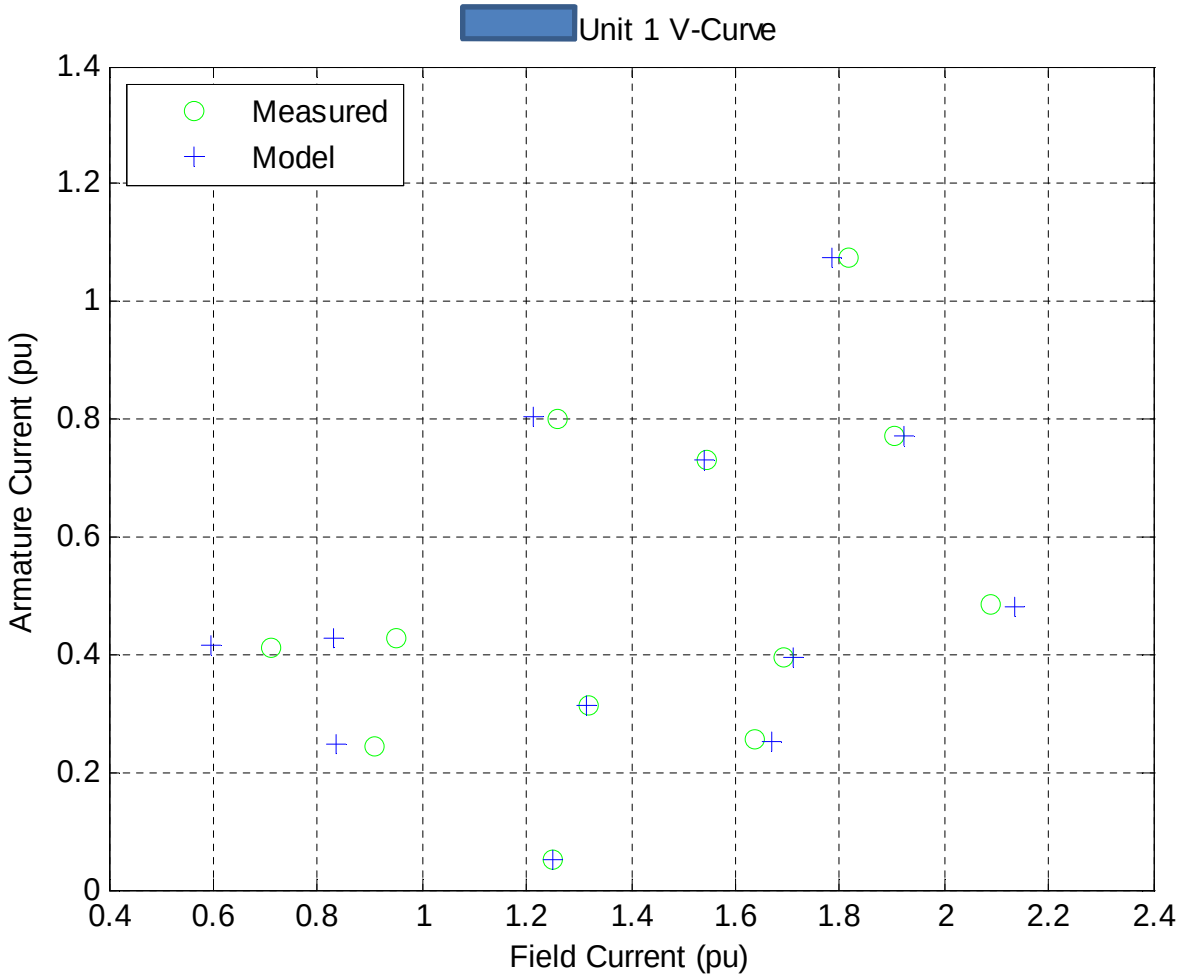
gentpj validation

Shawn Patterson

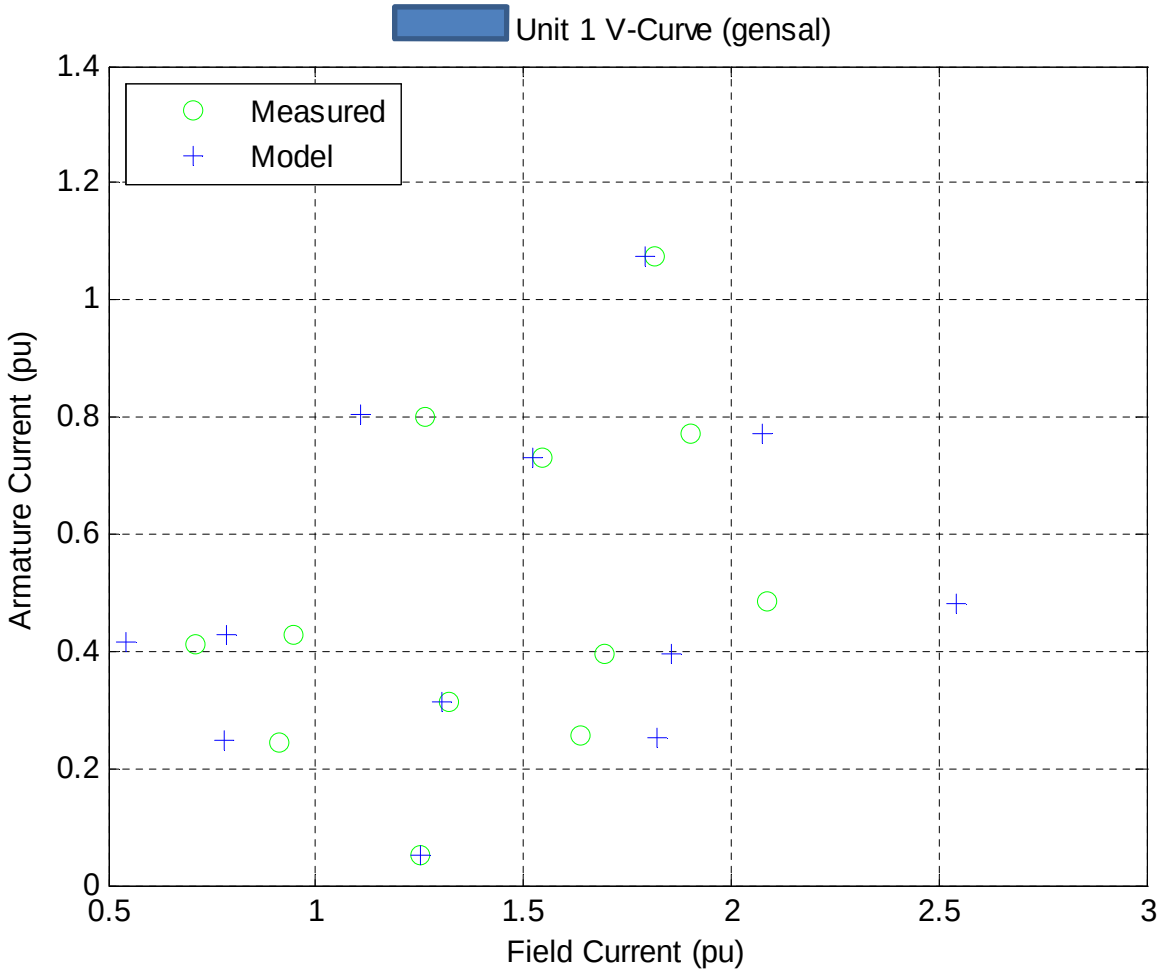
MVWG meeting

11-19-2010

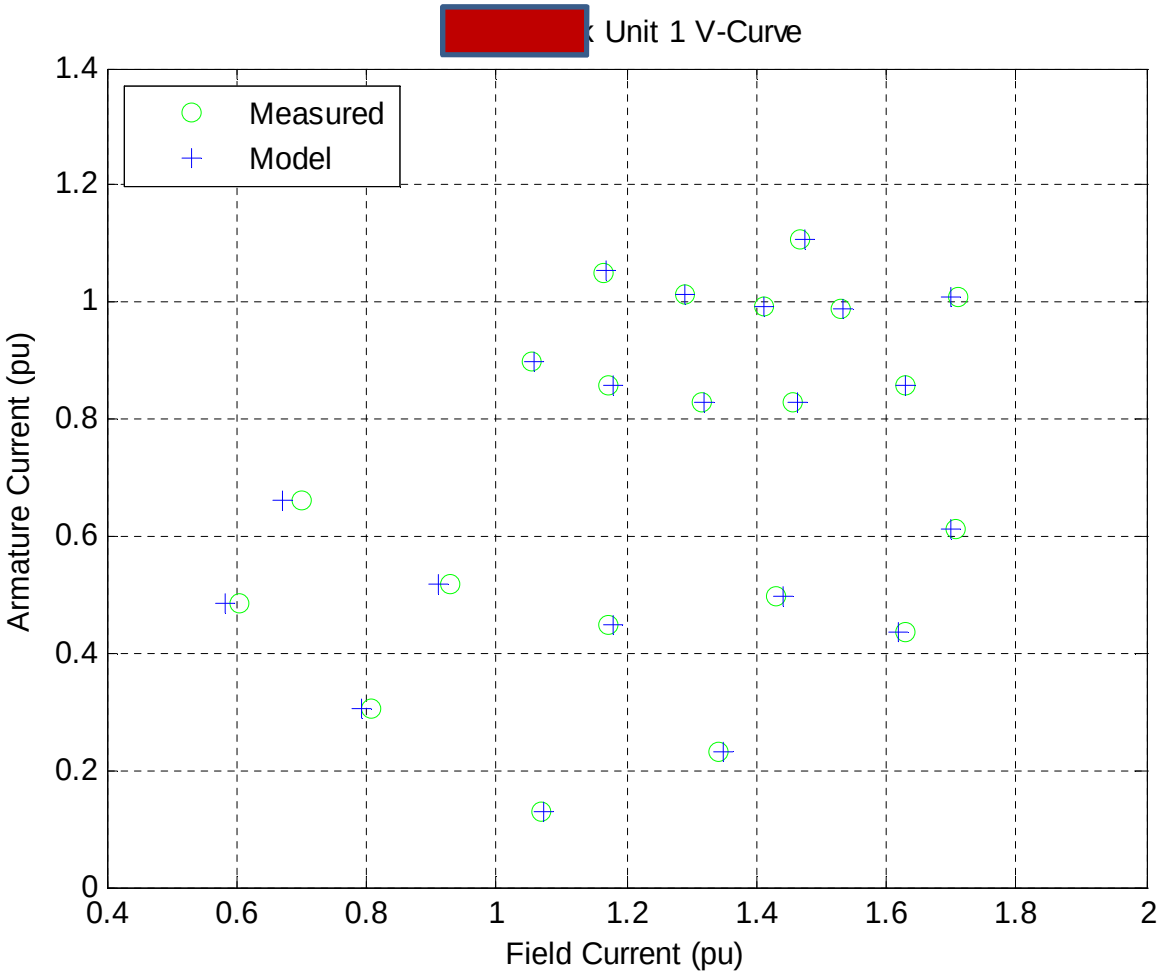
Steady State - gentpj



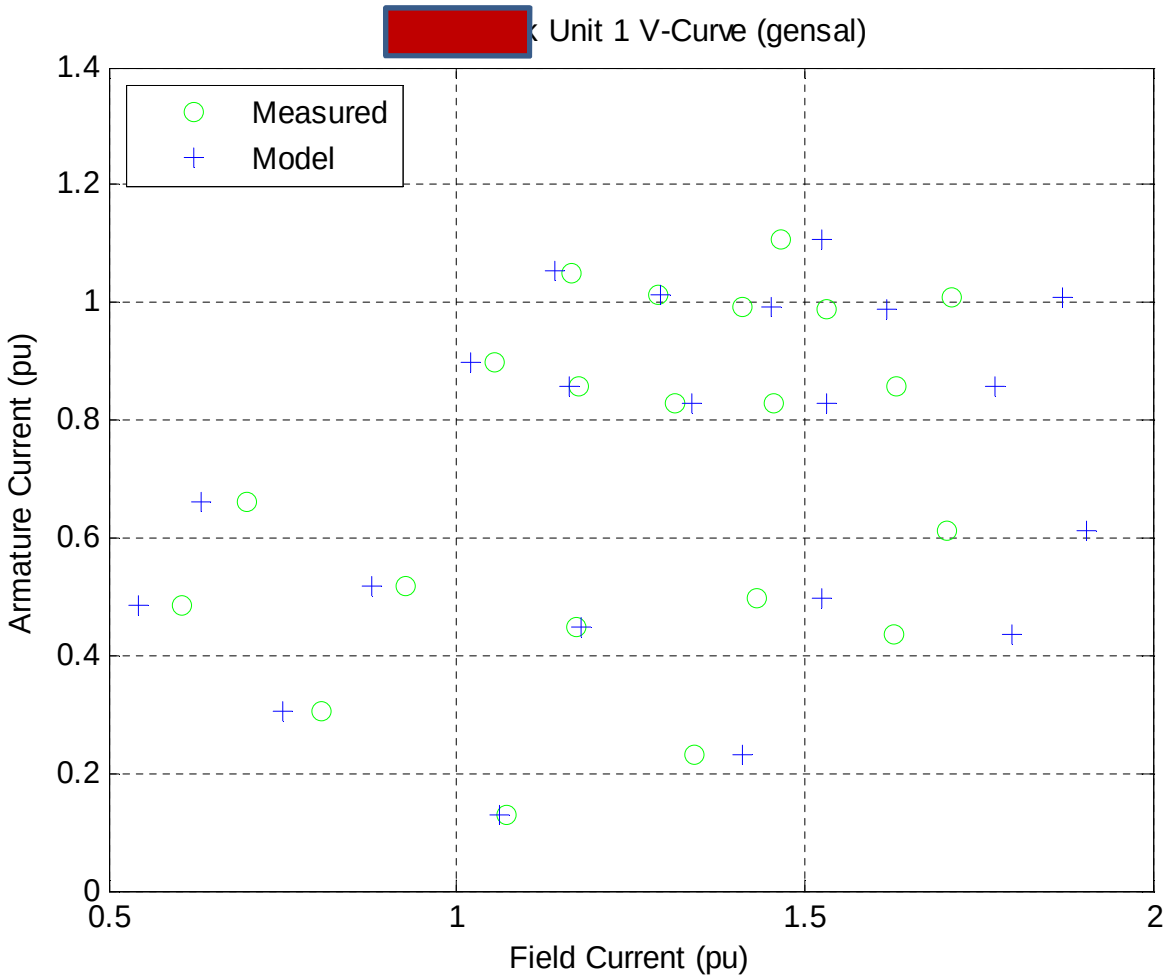
Steady State - gensal



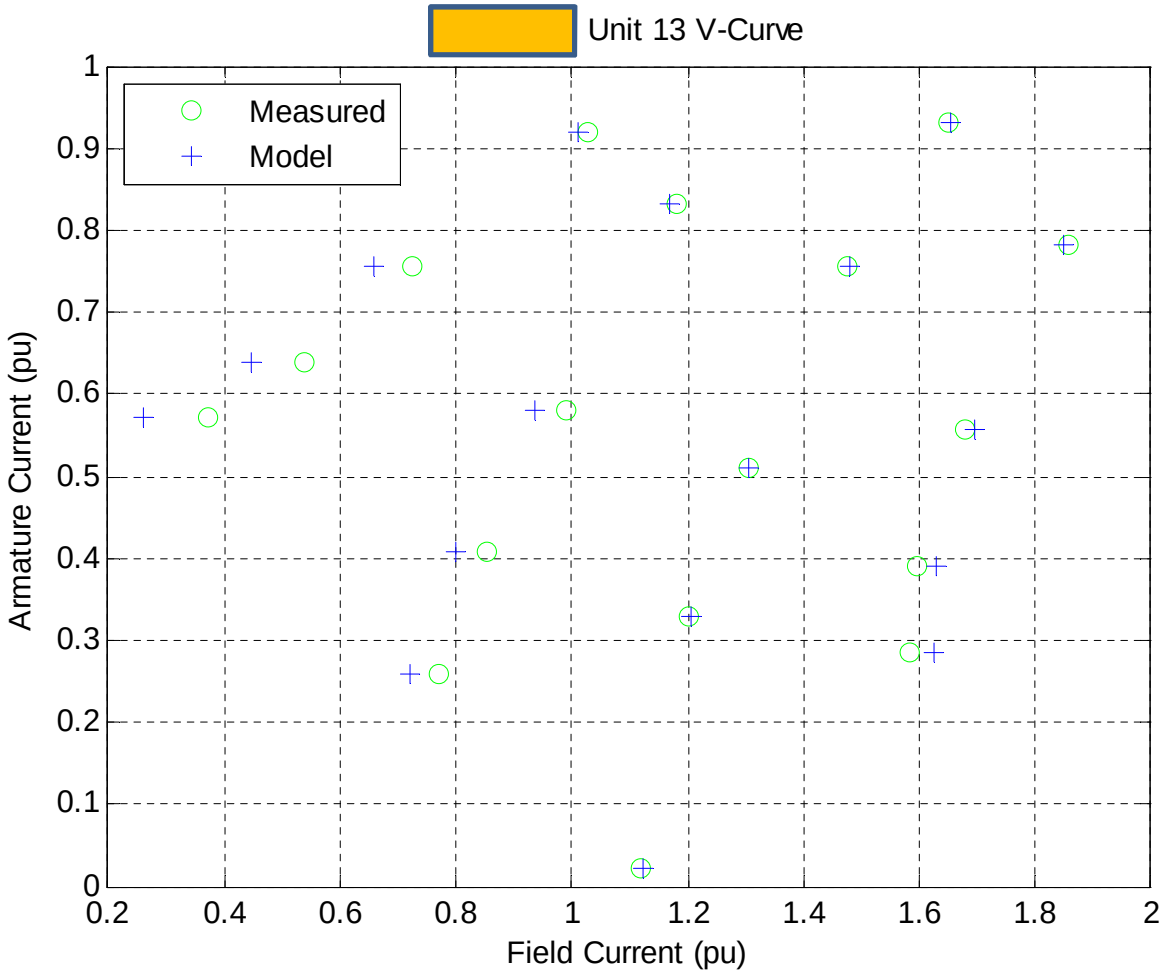
Steady State - gentpj



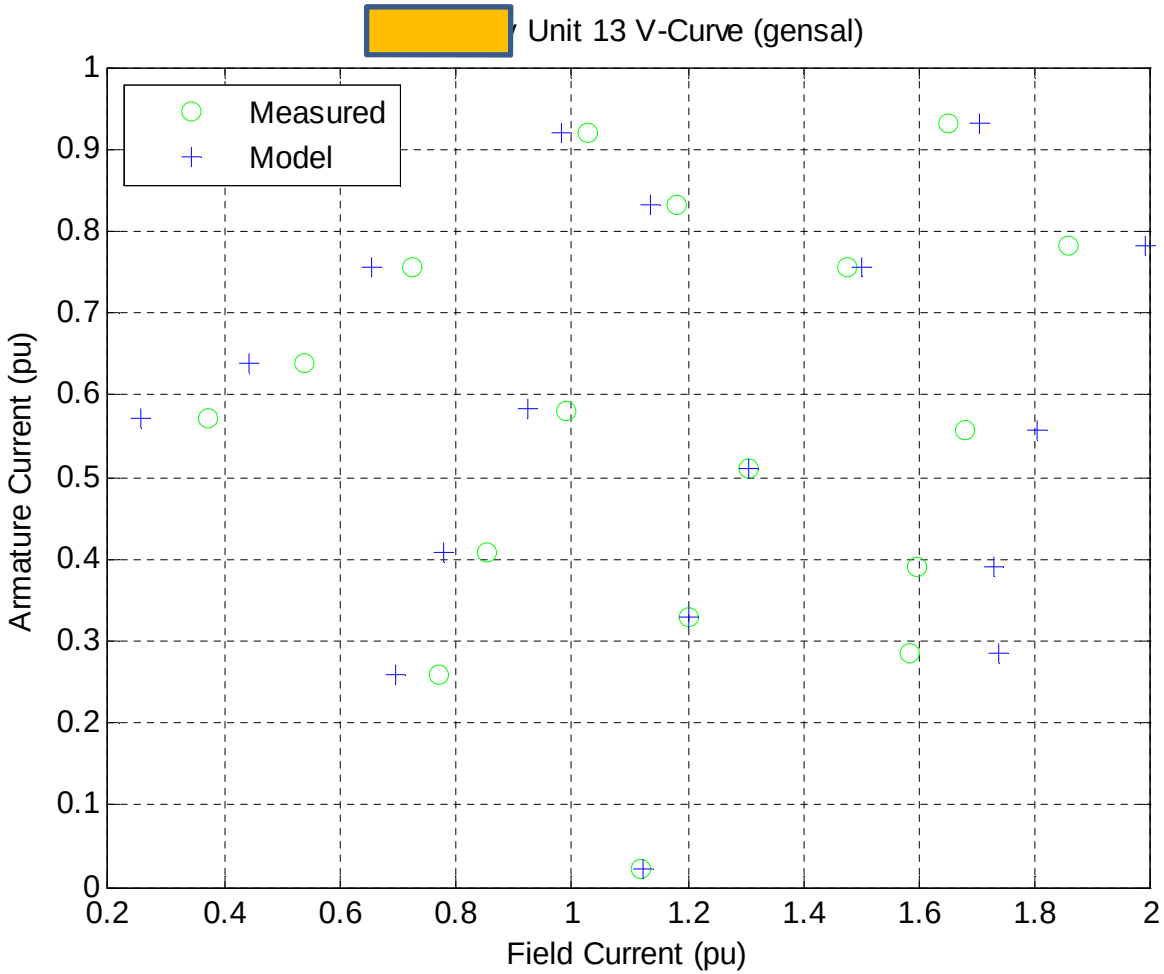
Steady State - gensal



Steady State - gentpj



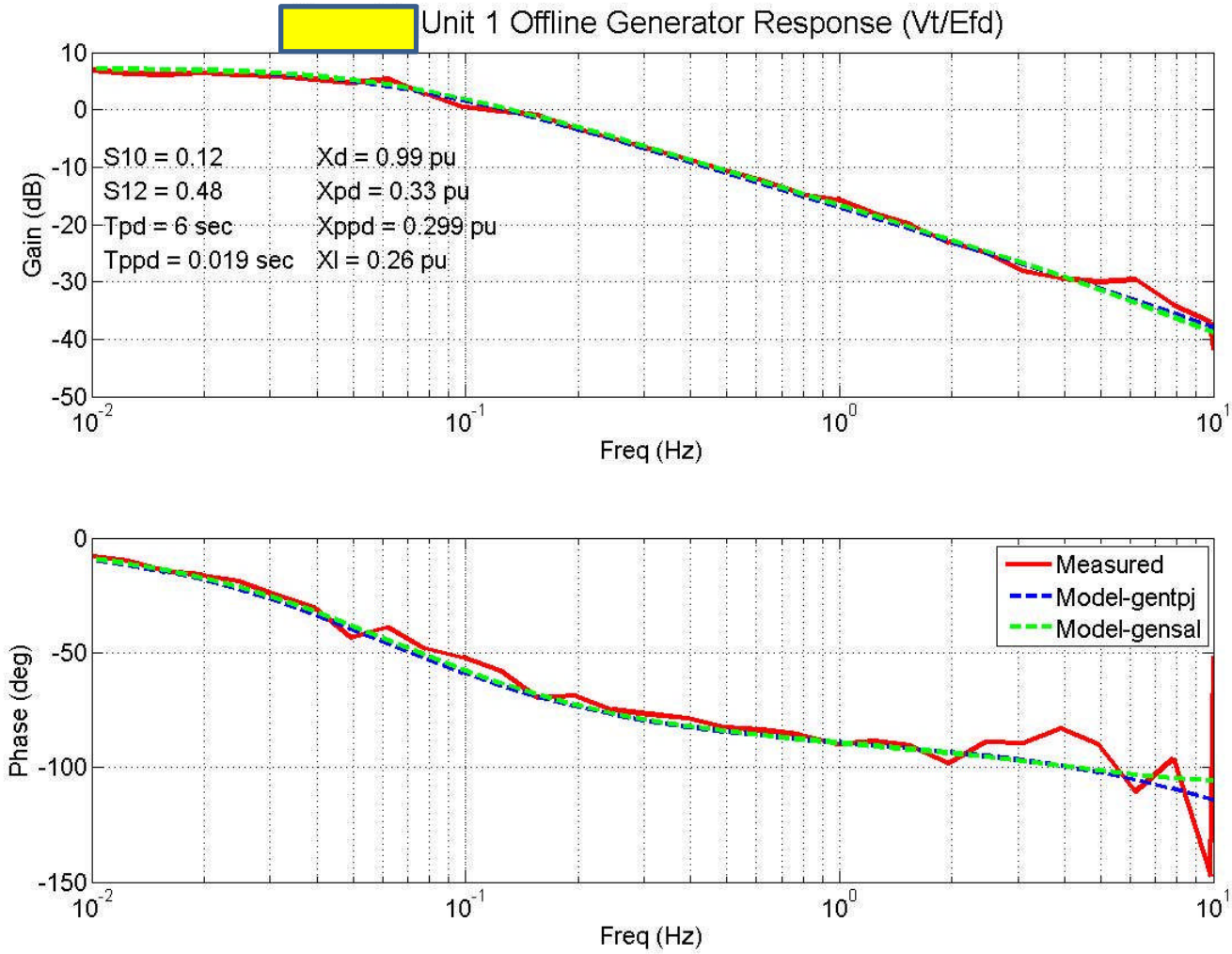
Steady State - gensal

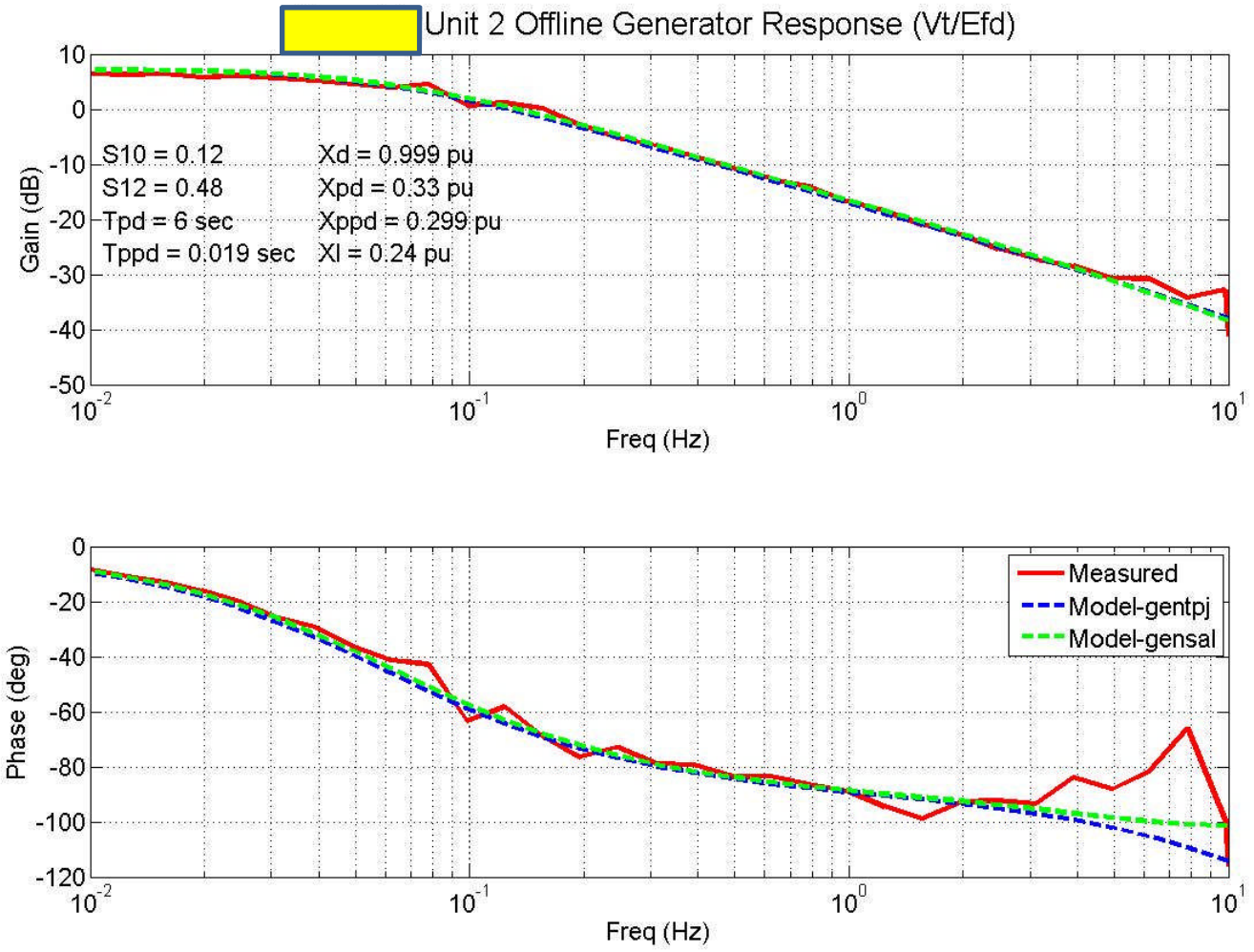


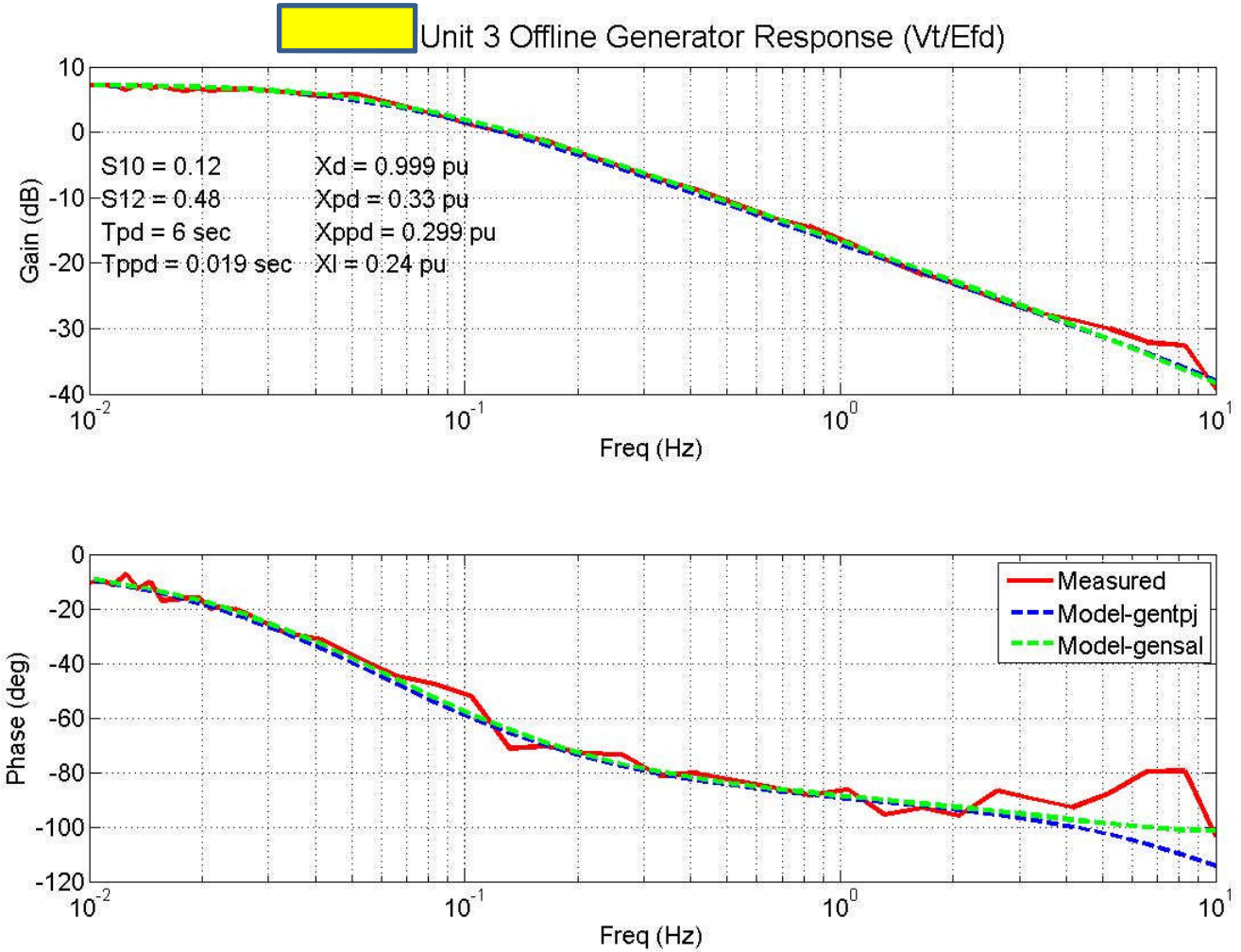
Steady State Recap

- **gensal** does not adequately model field current compared to measurements
- **gentpj** provides very good simulation of field current compared to measurements
- OEL operation and reactive capability of machine models depend on accurate field current simulation
- **gentpj** better than **gensal**

Dynamics – Vt/Efd (offline)




Unit 2 Offline Generator Response (Vt/Efd)
Gain (dB)
S10 = 0.12
S12 = 0.48
Tpd = 6 sec
Tppd = 0.019 sec
Xd = 0.999 pu
Xpd = 0.33 pu
Xppd = 0.299 pu
Xl = 0.24 pu
Freq (Hz)
Phase (deg)
Measured
Model-gentpj
Model-gensal
Freq (Hz)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Freq (Hz)
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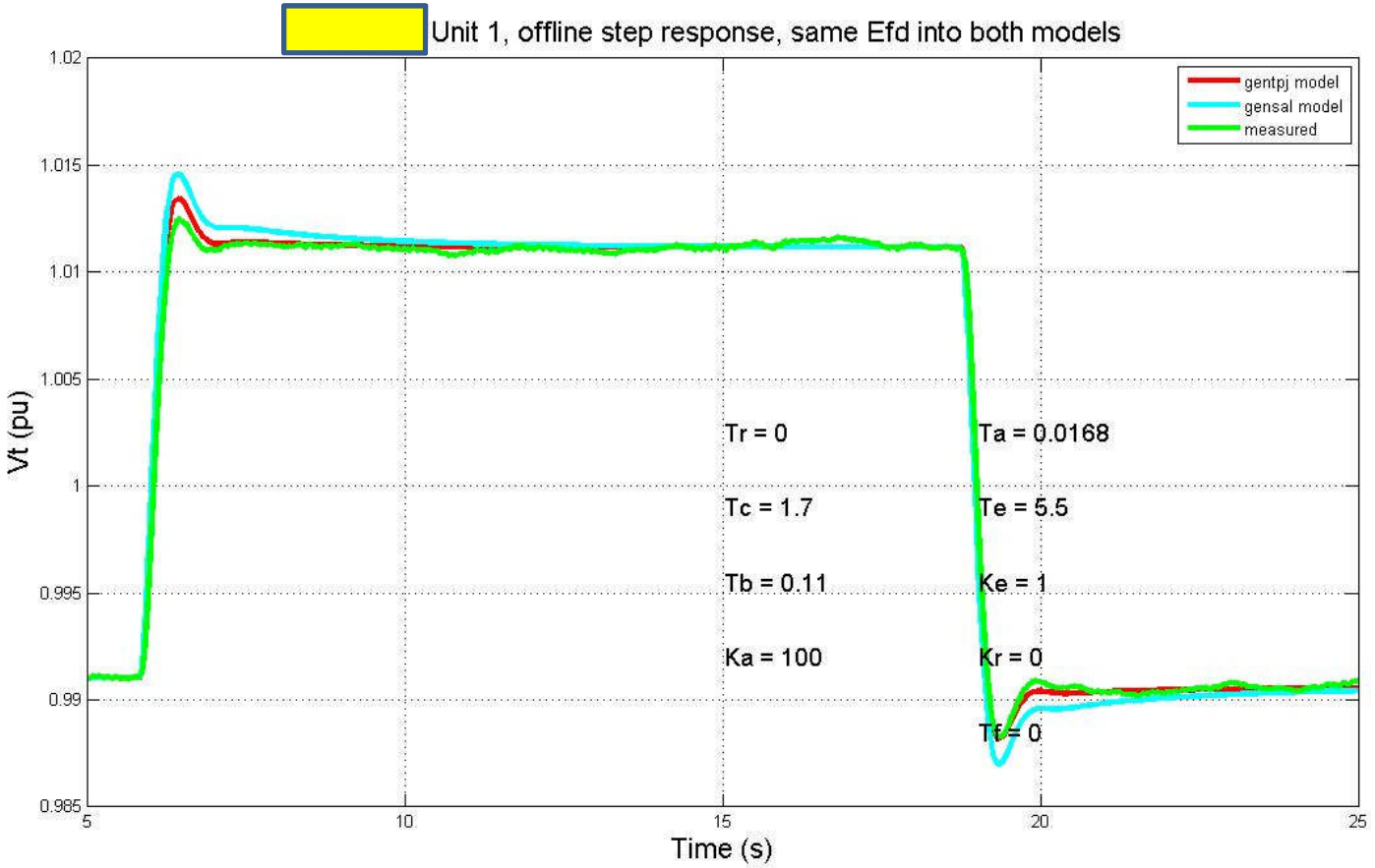
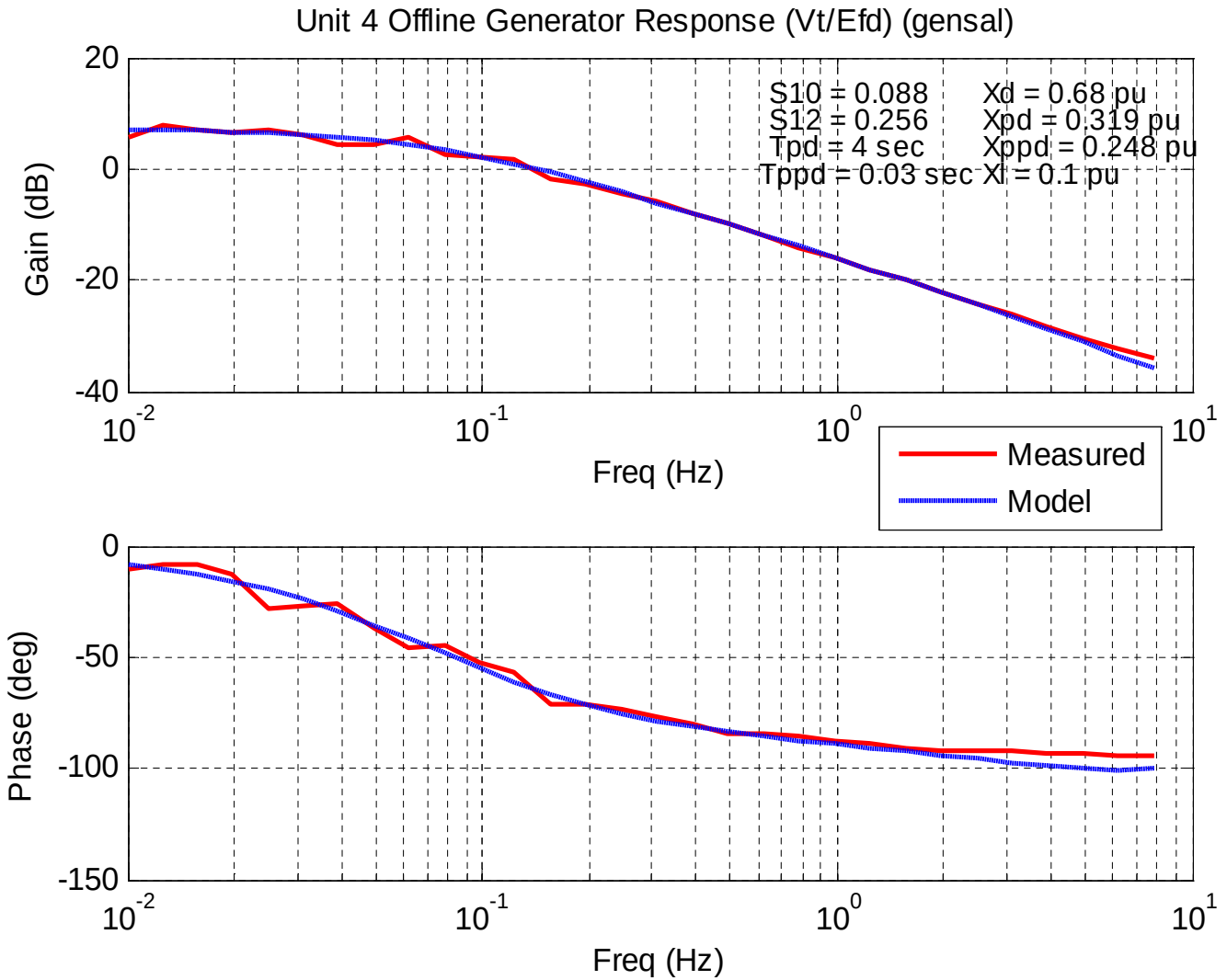
Model-gentpj
Model-gensal

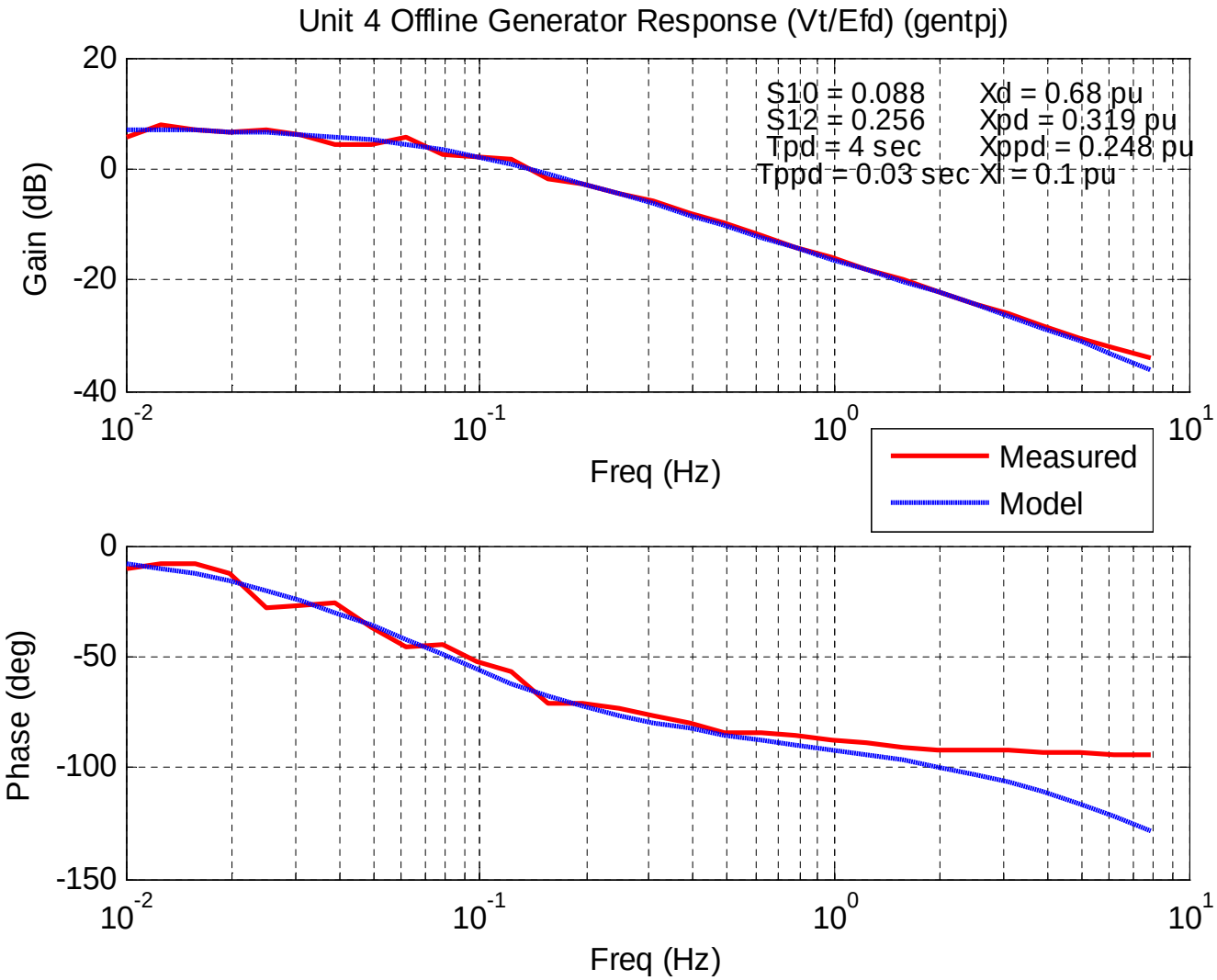
Machine models only



gensal


Unit 4 Offline Generator Response (Vt/Efd) (gensal)
S10 = 0.088
S12 = 0.256
Tpd = 4 sec
Tppd = 0.03 sec
Xd = 0.68 pu
Xpd = 0.319 pu
Xppd = 0.248 pu
Xl = 0.1 pu
Gain (dB)
Phase (deg)
Freq (Hz)
Measured
Model

gentpj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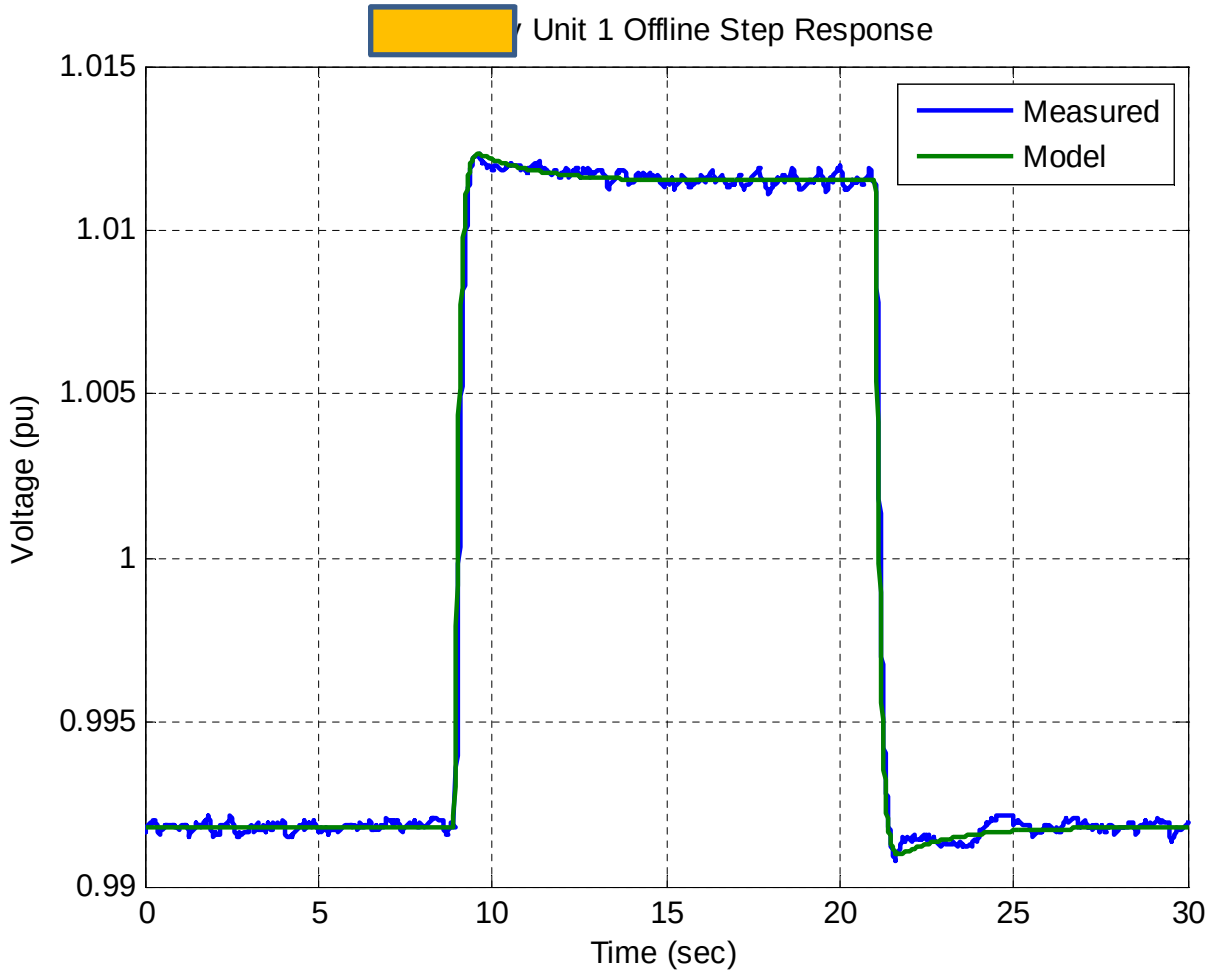
Measured
Model

Closed Loop – offline - gentpj



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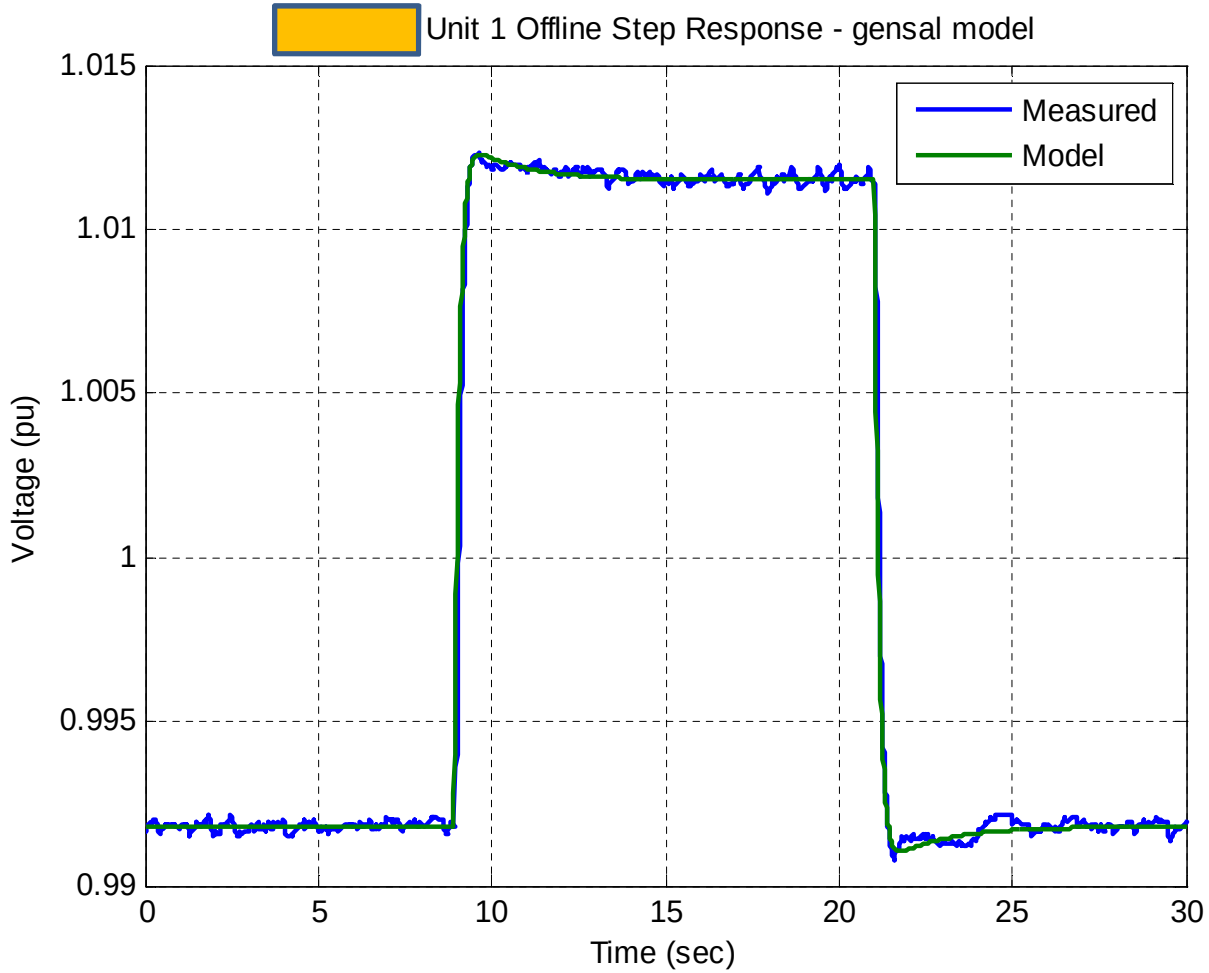

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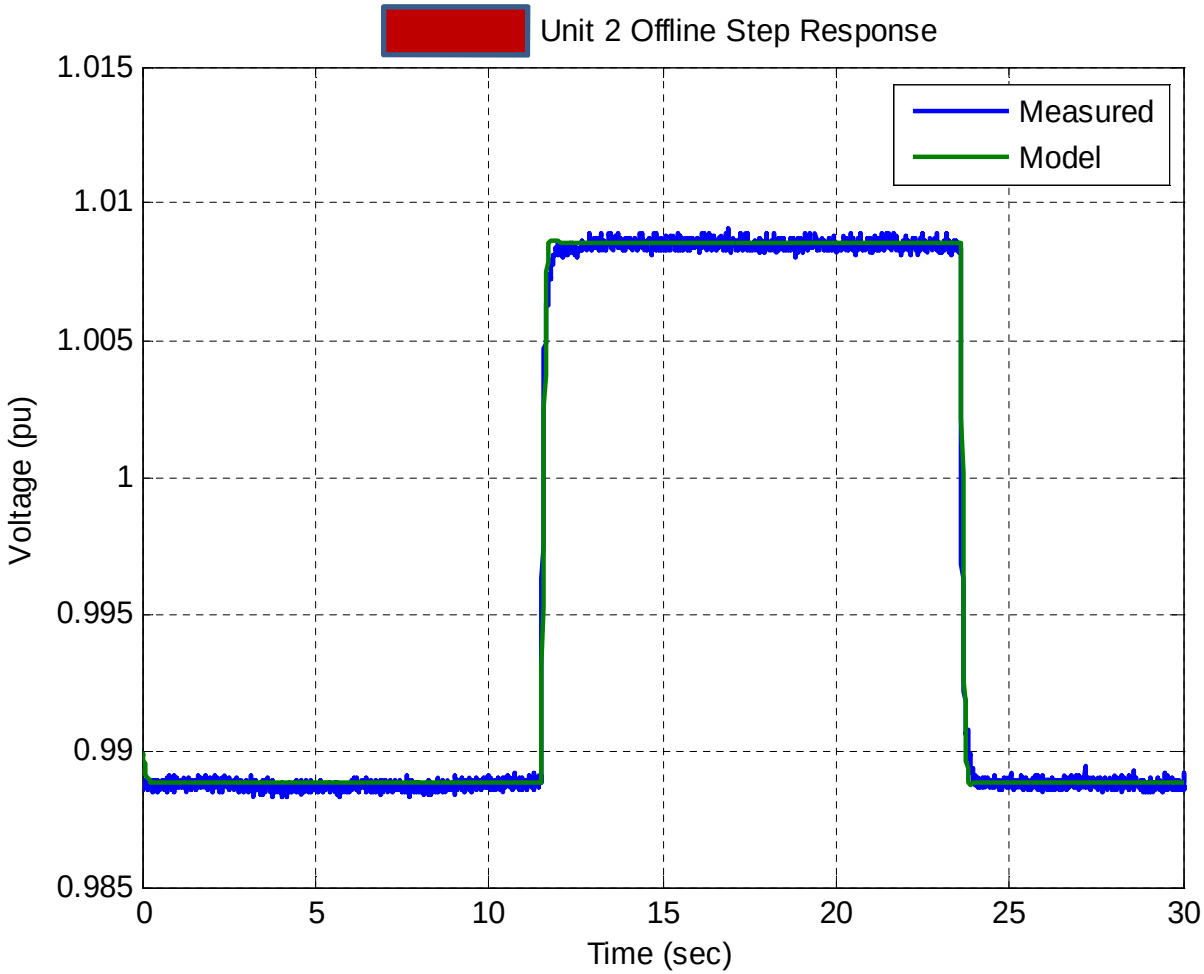

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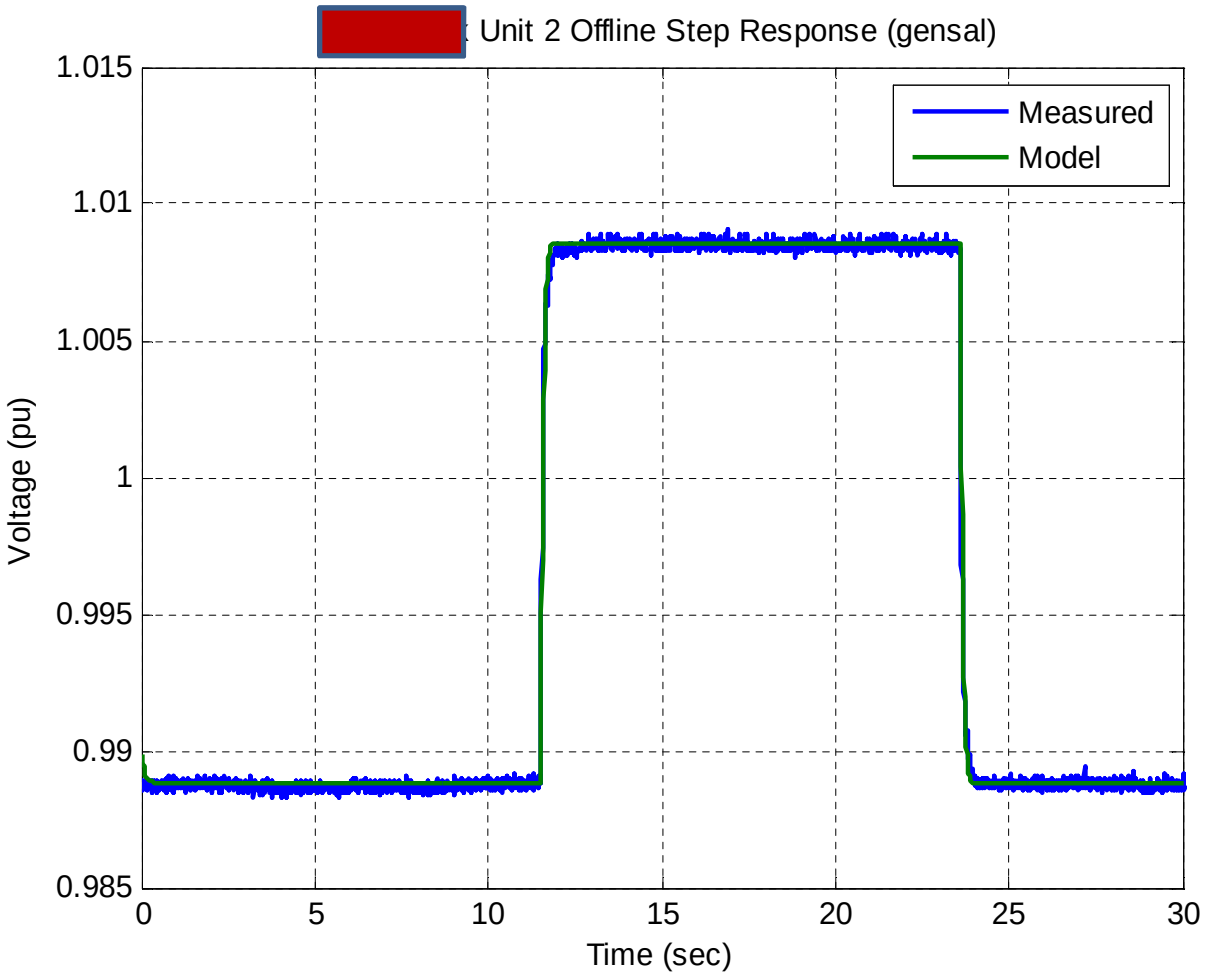

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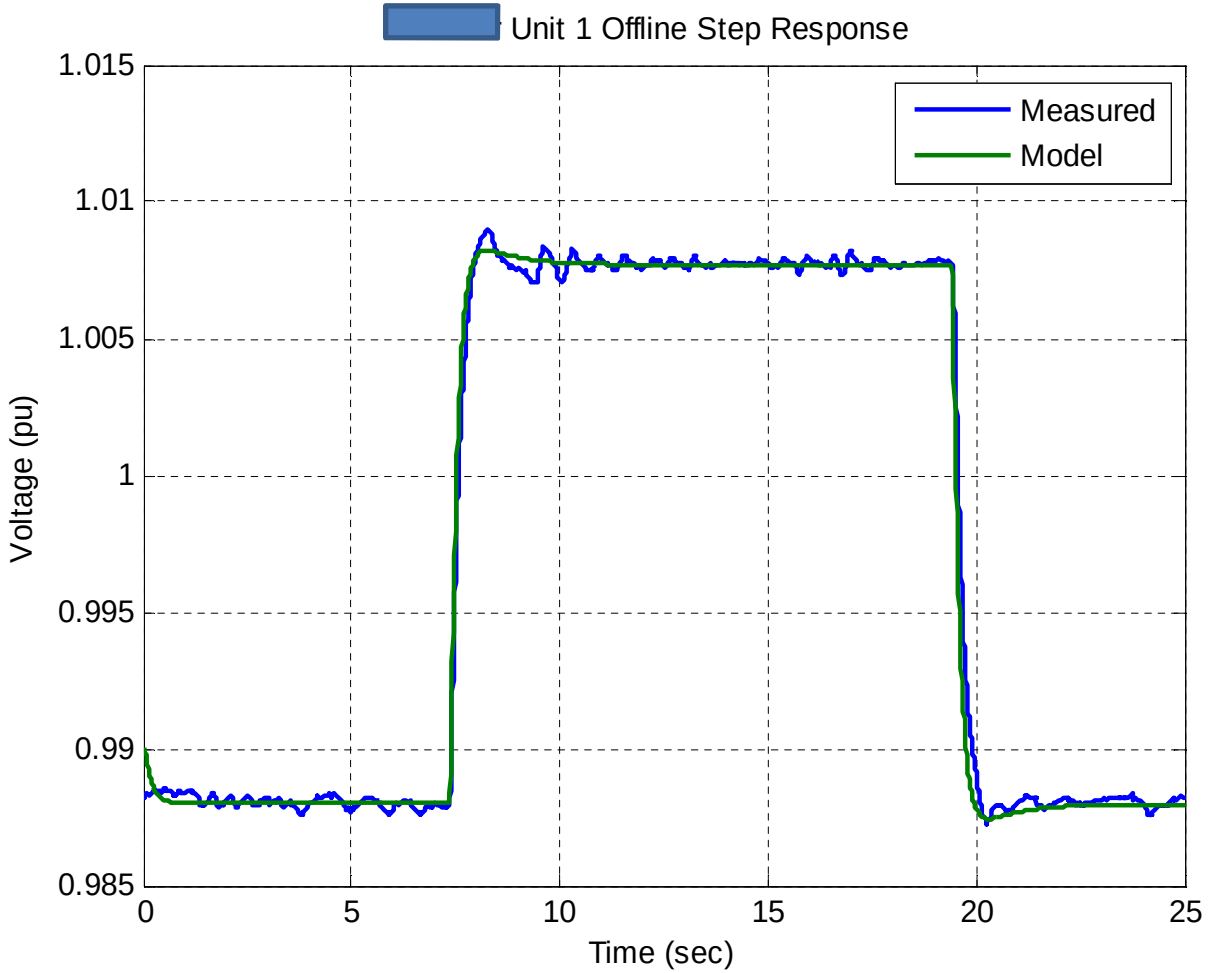

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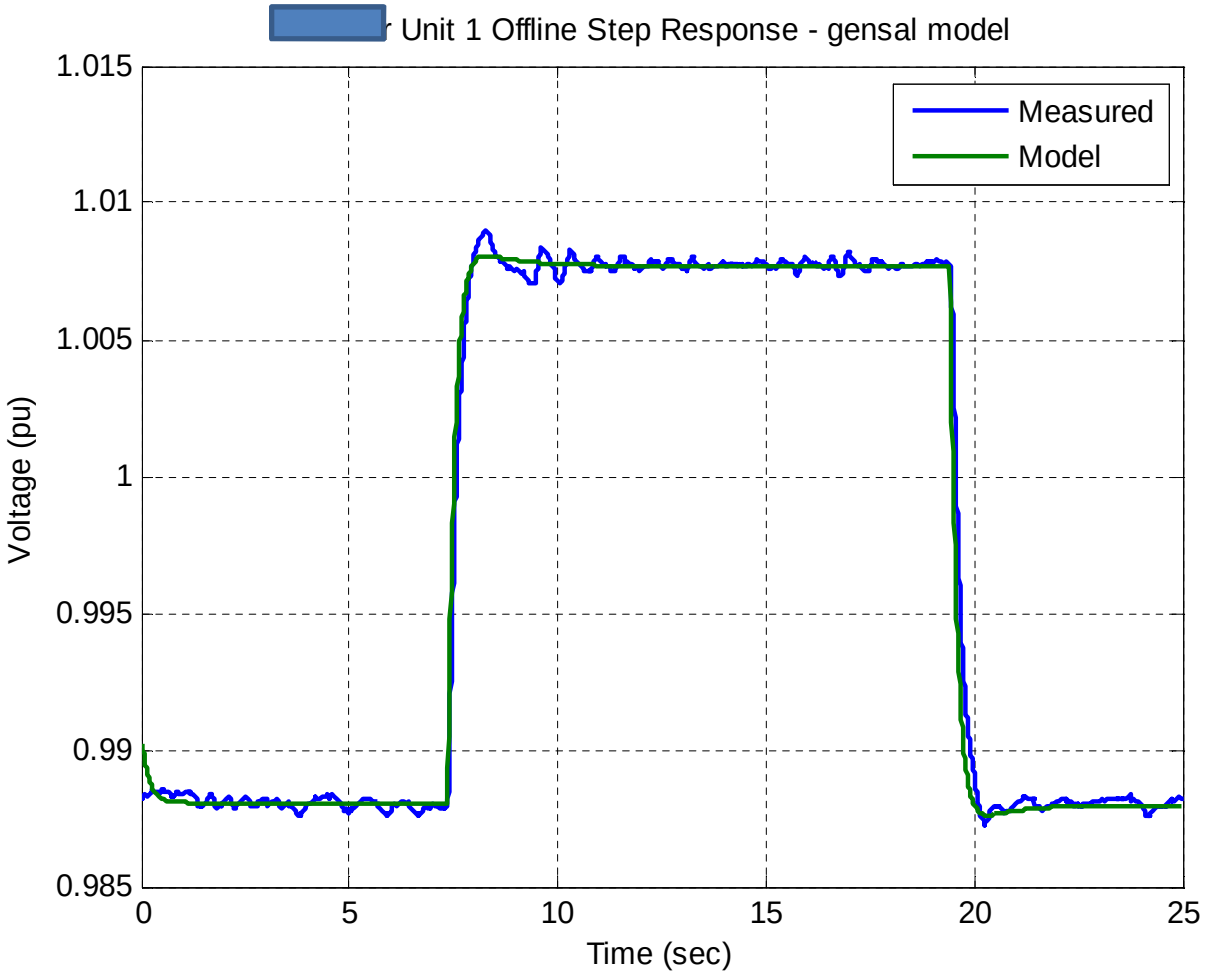
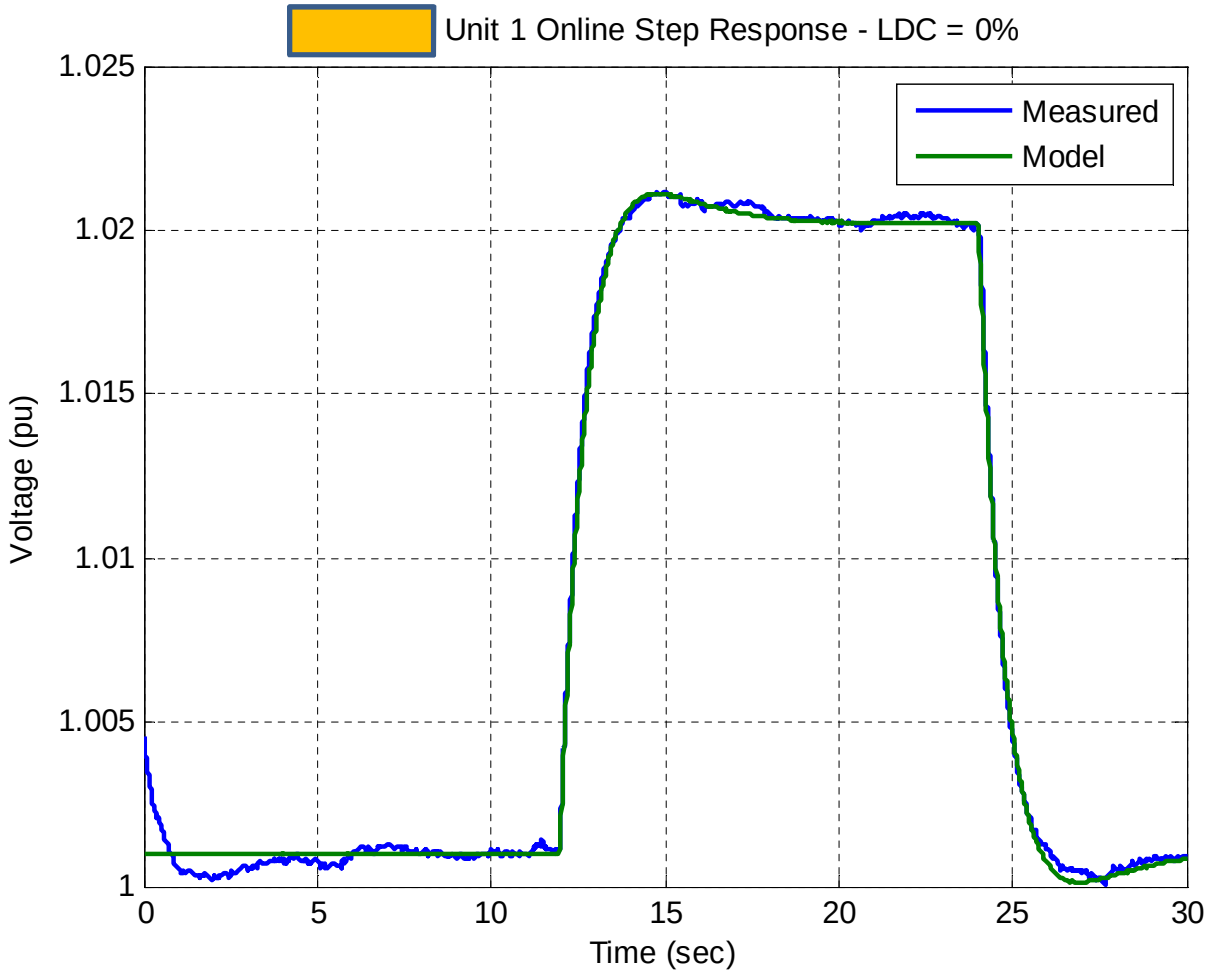
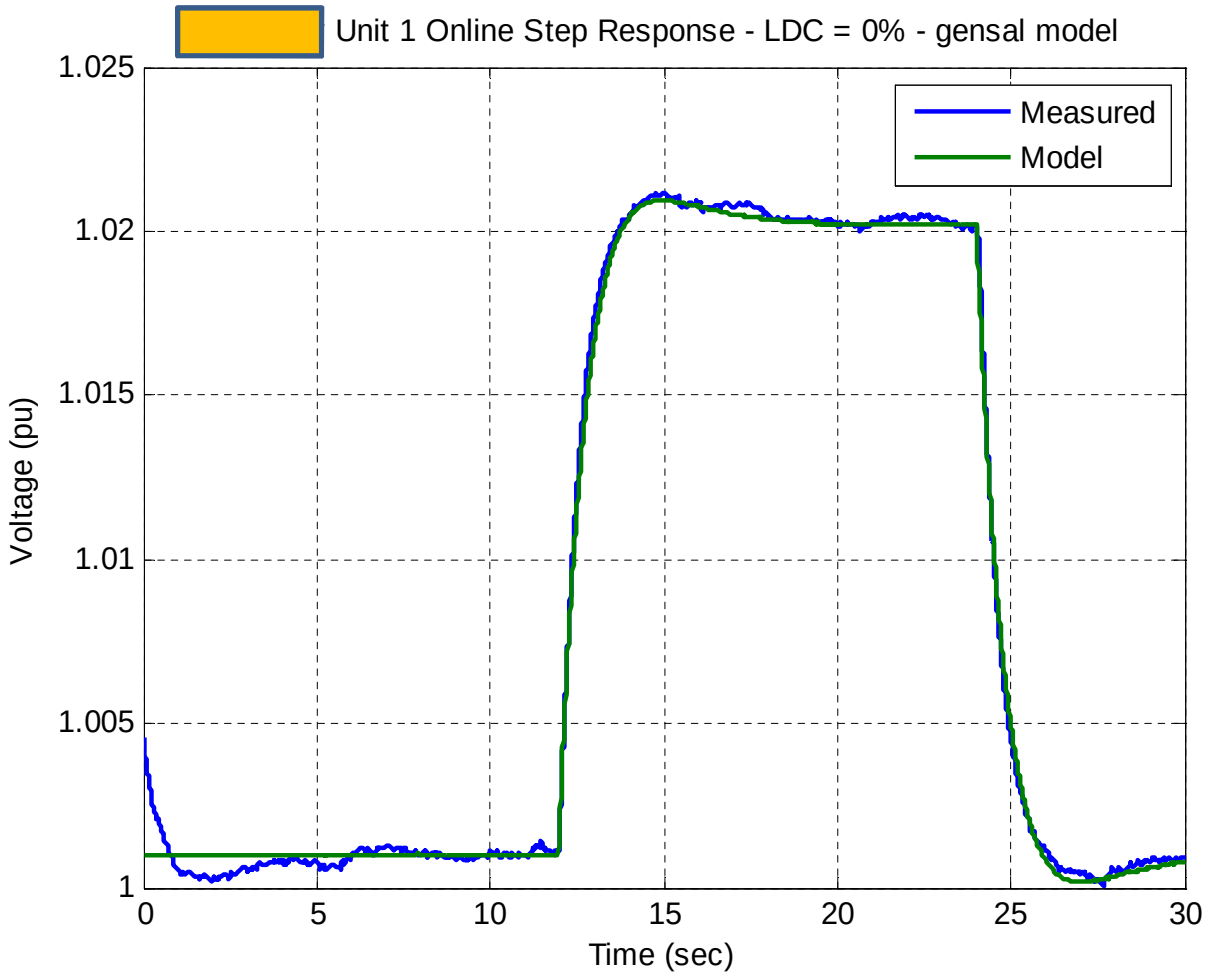


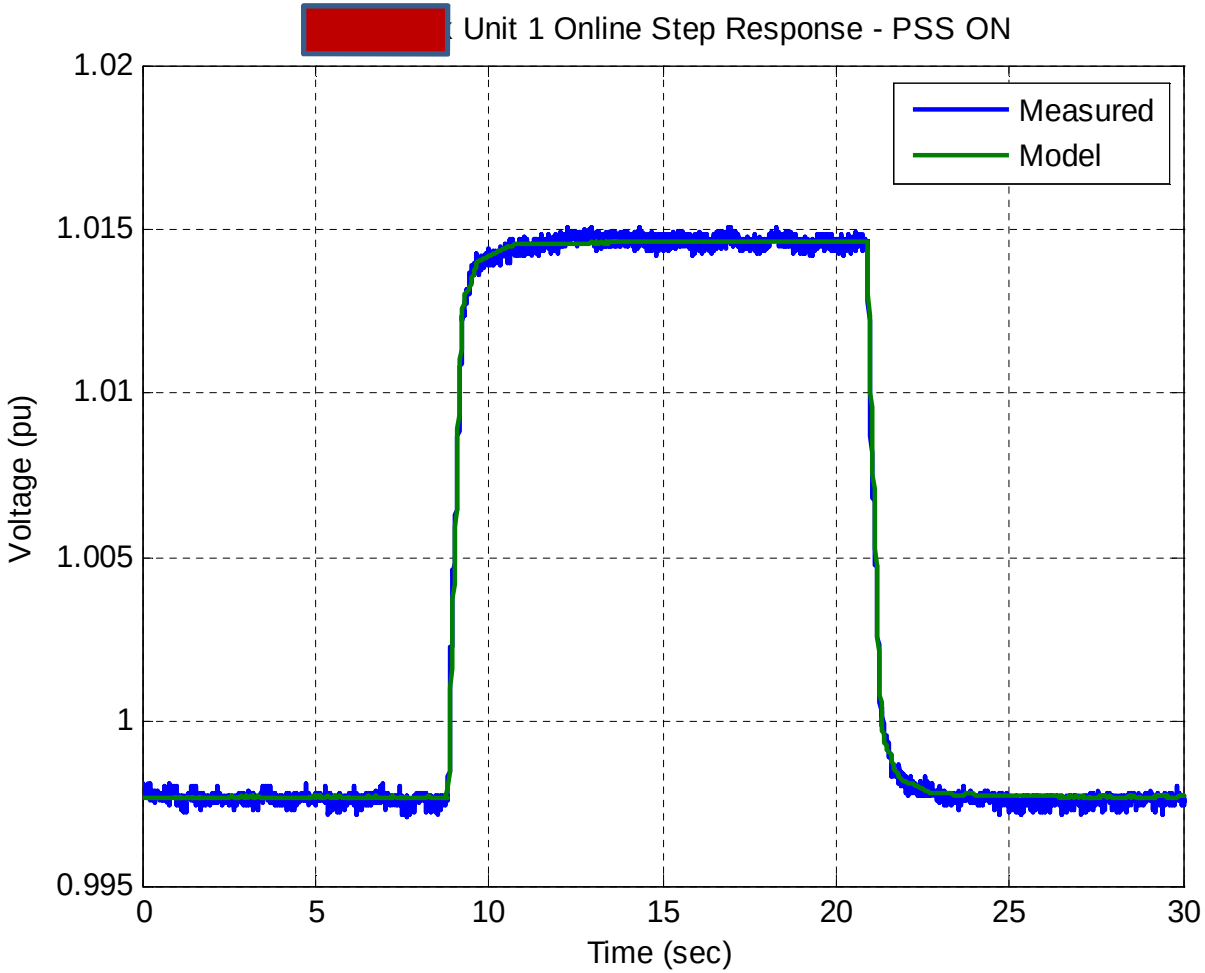
Closed Loop – Online, low load - gentpj



Closed Loop – Online, low load - gensal



Closed Loop – Online, full load - gentpj



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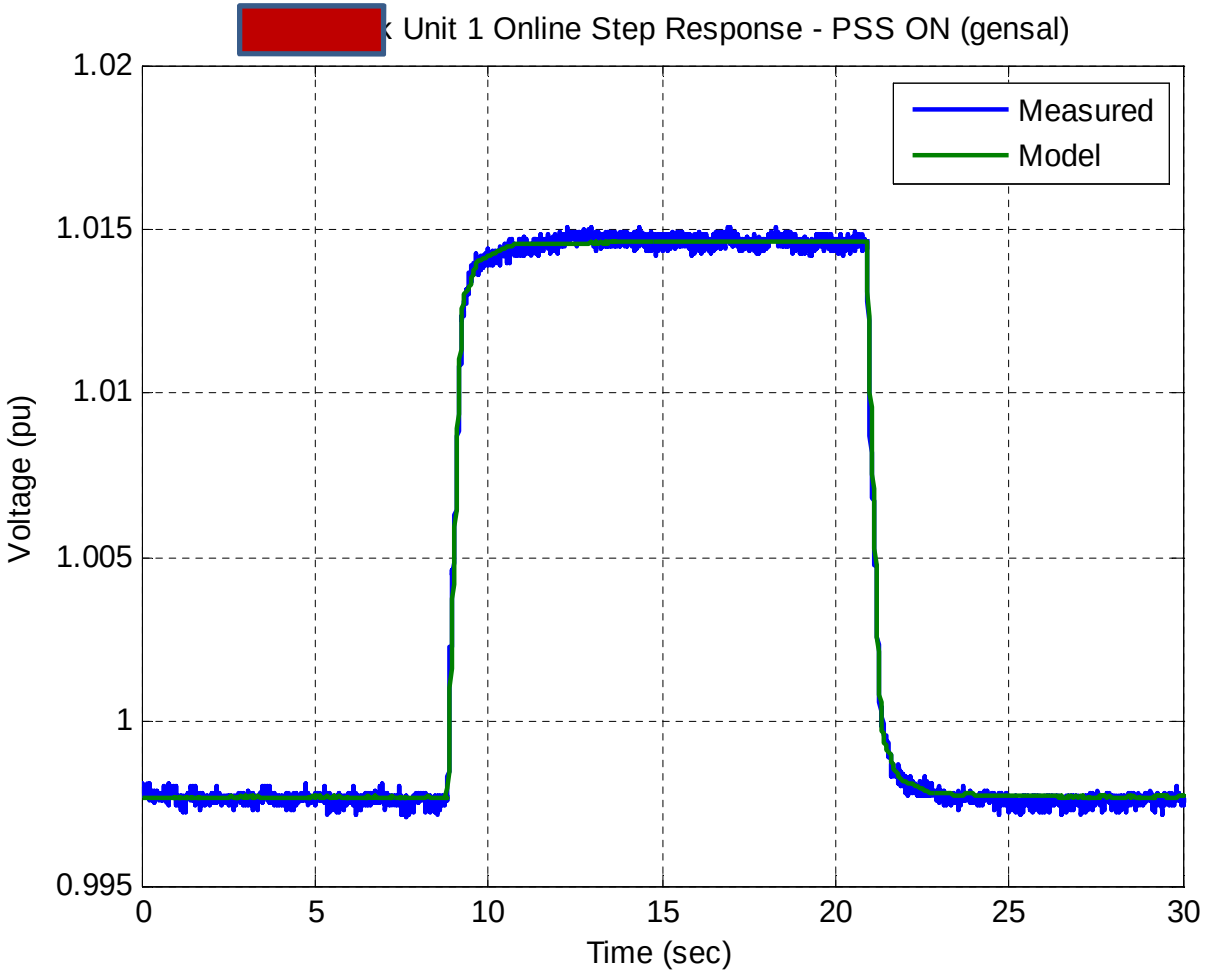

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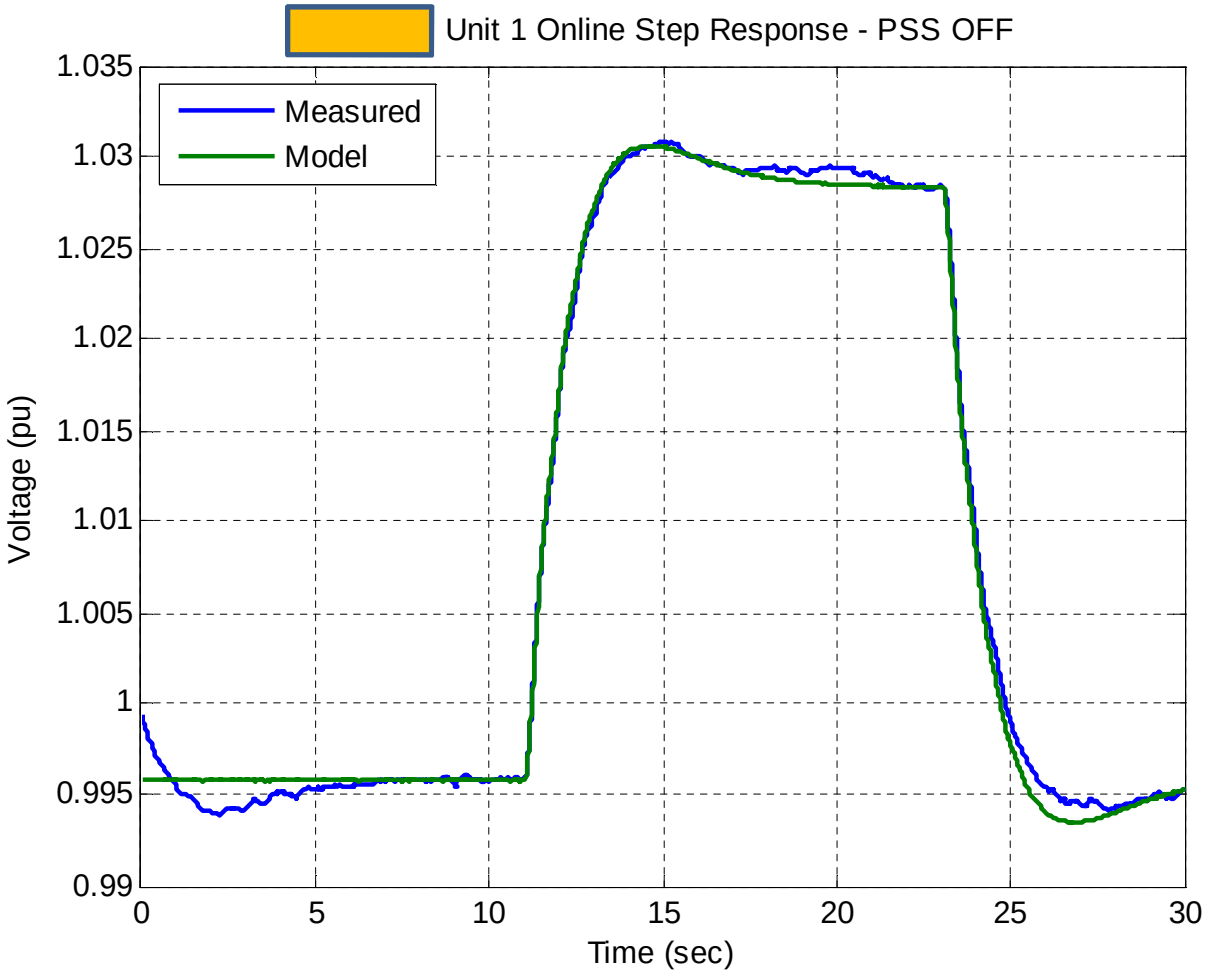

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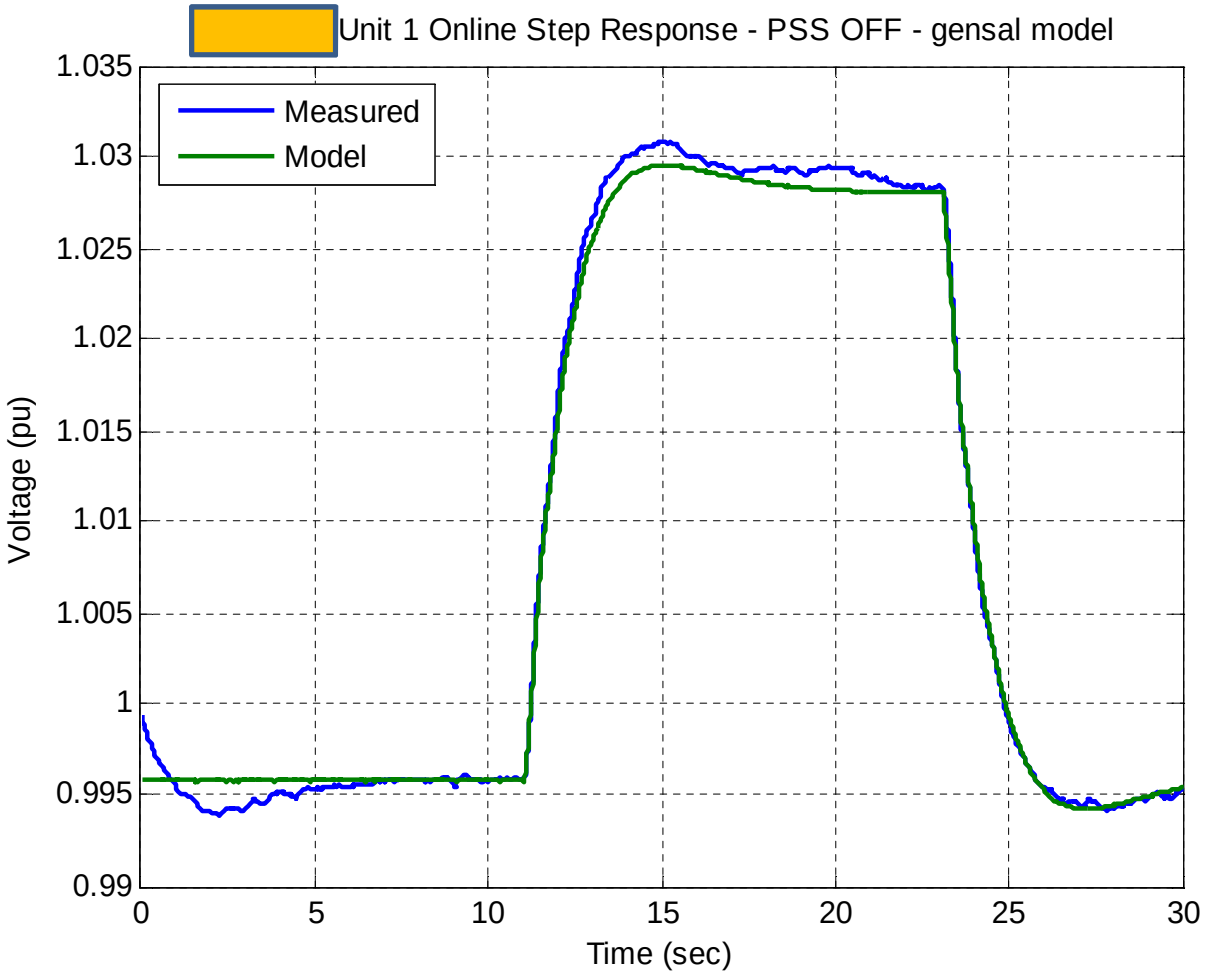

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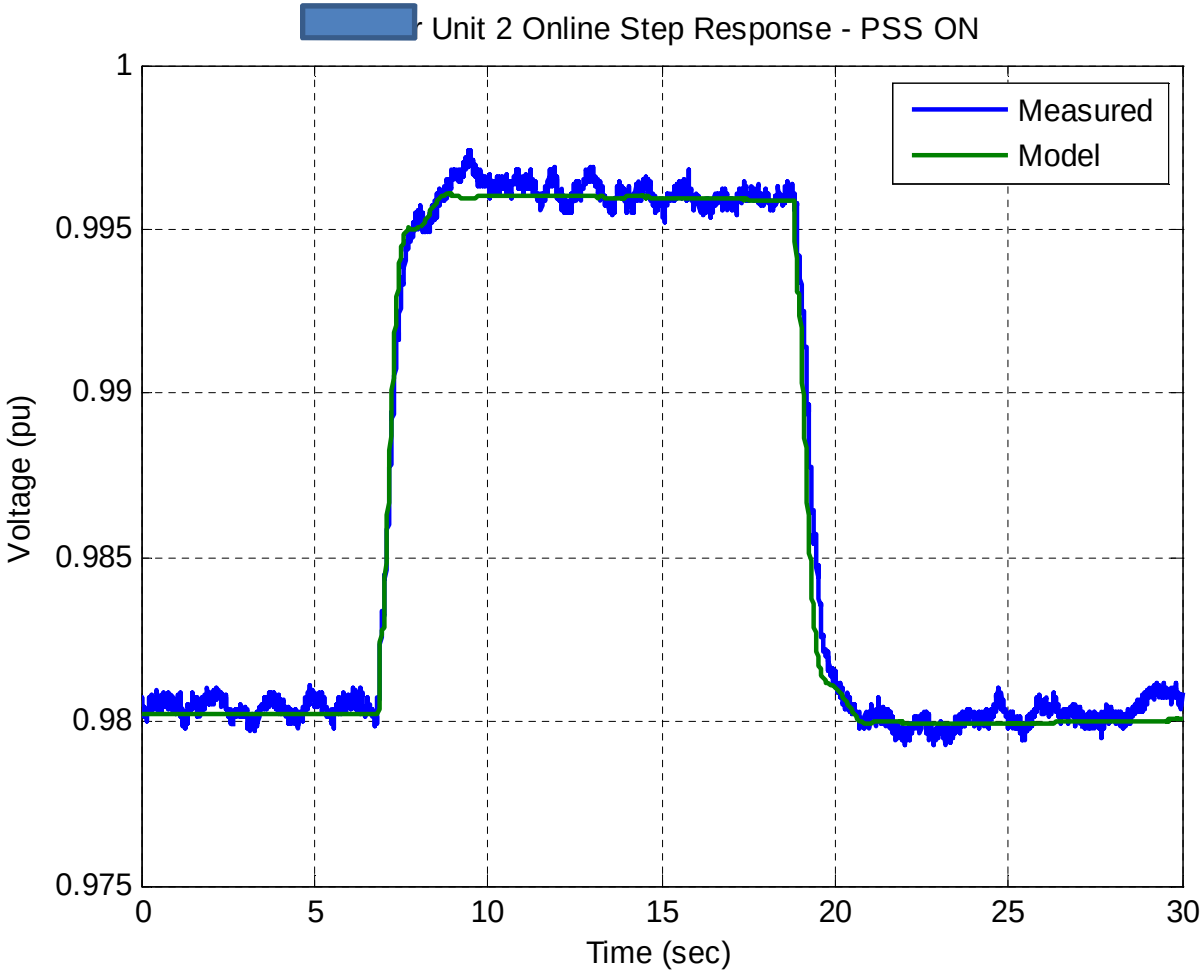

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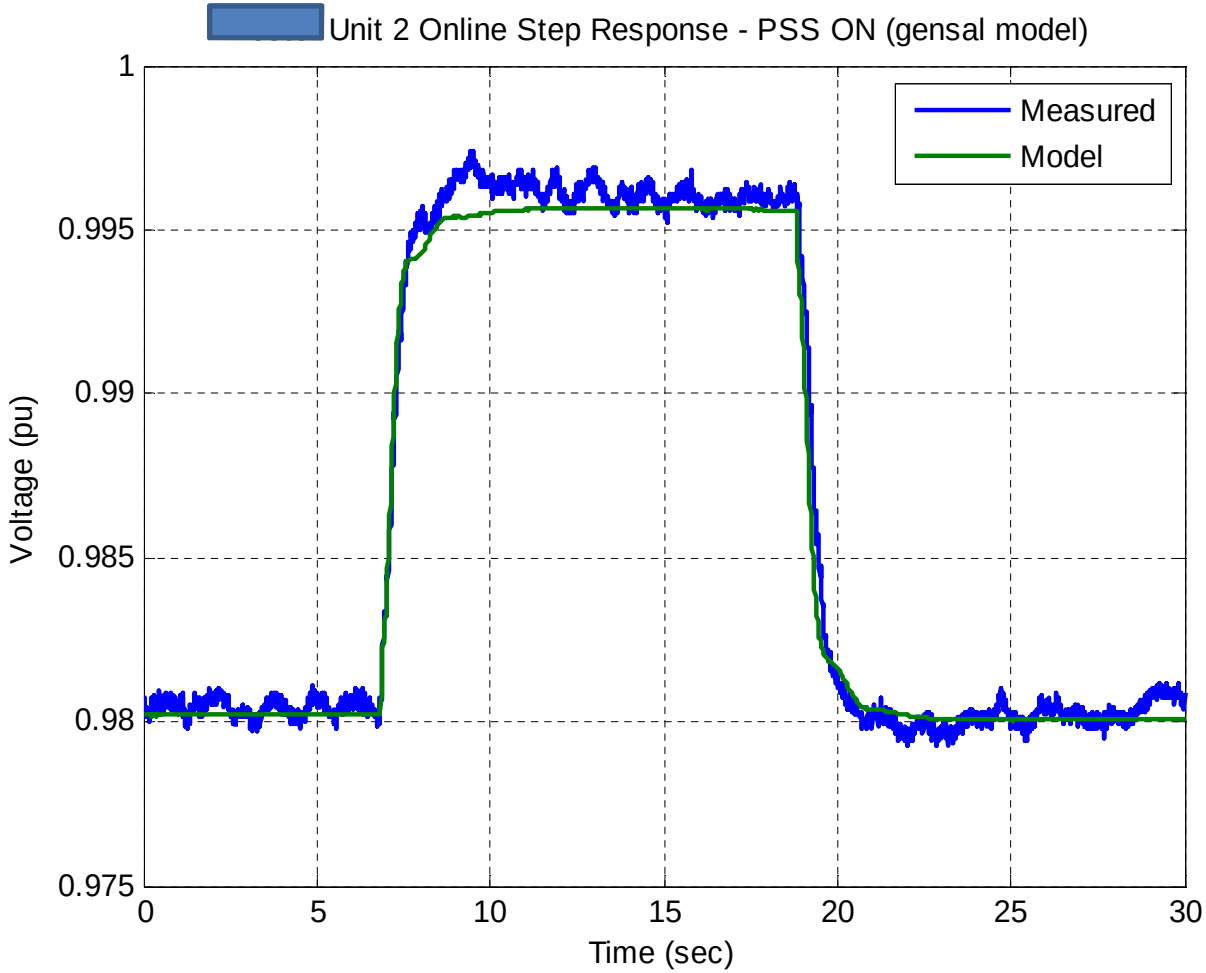
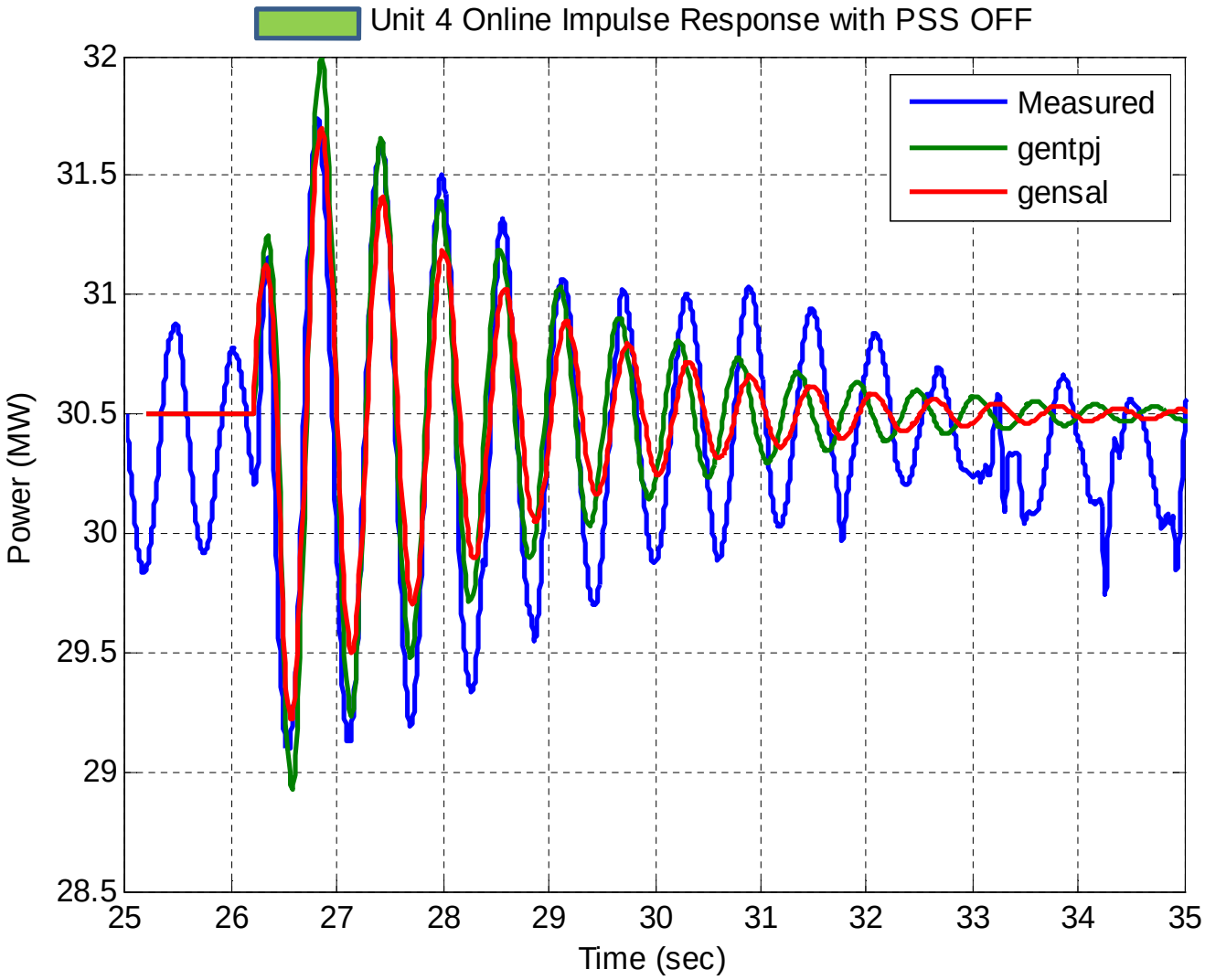
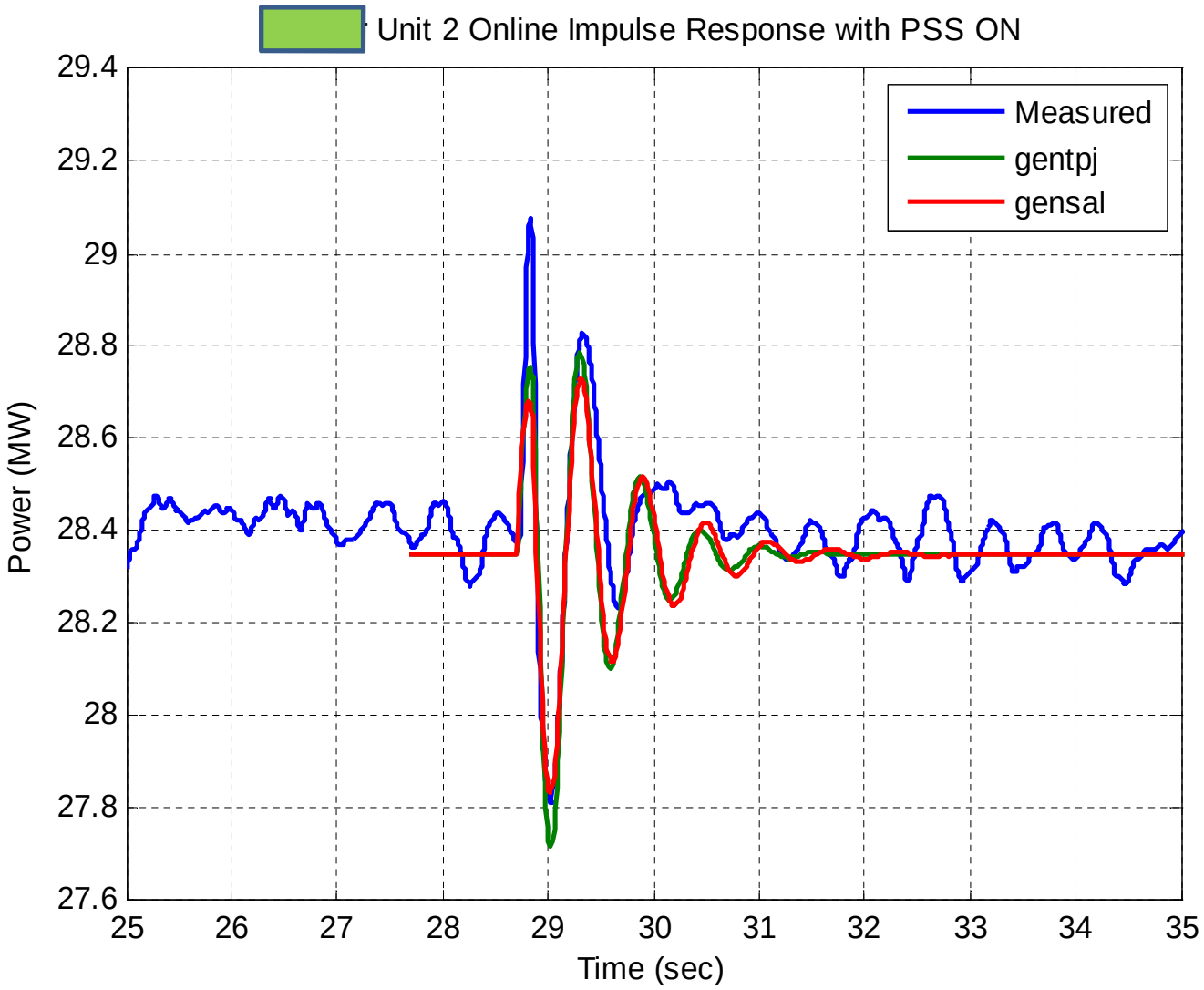


Oscillations



Oscillations – with PSS



Summary

- **gentpj** better than **gensal** in steady state
- **gentpj** and **gensal** are similar in staged dynamic tests
- **gentpj** models can provide slightly more damping than **gensal**
- WECC (then WSCC) program used **gentpf** model, which is the basis of **gentpj**
- **gensal** models should be replaced with **gentpj**