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NASPI-NERC Workshop PPMV Tools

Calibration Session Simulations

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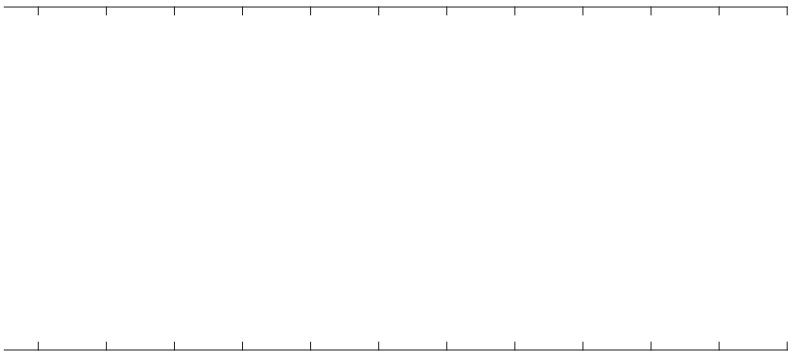
RELIABILITY | ACCOUNTABILITY




Example GAS Unit Sensitivities



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Example GAS Unit Sensitivities

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Example Steam Unit Sensitivities

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Example Steam Unit Sensitivities

Steam Unit Results
Georgia Tech

Steam Unit Results MathWorks

Steam Unit Results
EPG

Steam Unit Results PNNL

Conclusions

- Consider the Steam Unit calibration results

Param	Actual Model	Corrupt Model	EPG	Georgia Tech	MathWorks	PNNL
Xd	2.3	2.3	2.3	2.2	2.301	2.258
X'd	0.3	0.3	0.3	0.3	0.401	0.31
X''d	0.3	0.3	0.3	0.2	0.3	0.293
Xq	**2.07**	**1.5**	**1.5**	**1.6**	**1.501**	**2.065**
X'q	0.53	0.53	0.53	0.6	0.531	0.516
X''q	0.3	0.3	0.3	0.3	0.301	0.293
Xl	0.25	0.25	0.25	0.25	0.251	0.23
Ra	0.004	0.004	0.004	0.004	0.004	0.004
T'd0	**6.5**	**3.2**	**6.2**	**5**	**3.201**	**6.8**
T''d0	**0.05**	**0.15**	**0.15**	**0.1**	**0.15**	**0.036**
T'q0	**0.55**	**0.8**	**0.8**	**0.8**	**0.801**	**0.563**
T''q0	0.07	0.07	0.07	0.07	0.07	0.071
S(1.0)	0.14	0.14	0.14	0.14	0.14	0.1582
S(1.2)	0.4	0.4	0.4	0.4	0.4	0.3936
H	**2.3**	**4**	**2**	**4**	**4.001**	**2.163**
D	0	0	0	0	0.005	0

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D	0	0	0	0	0.005	0

Conclusions

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Tr	0	0	0	0	0.001	0
Kpr	**5**	**10**	**5**	**10**	**9.958**	**5**
Kir	**5**	**10**	**5**	**10**	**10.271**	**5**
Ta	0.02	0.02	0.02	0.02	0.03	0.02
Vrmax	1	1	1	1	1	1
Vrmin	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85
Kpm	1	1	1	1	0.123	1
Kim	0	0	0	0	0.099	0
Vmmax	1	1	1	1	1	1
Vmmin	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85
Kg	0	0	0	0	0.099	0
Kp	10.25	10.25	10.25	10.25	10.251	10.23
Ang p	0	0	0	0	0	0
Ki	0	0	0	0	0	0
Kc	0.15	0.15	0.15	0.15	0.172	0.15
Xl	0	0	0	0	0.001	0
Vbmax	12.8	12.8	12.8	12.8	12.8	12.8
Vgmax	999	999	999	999	999	999

Conclusions

Param	Actual Model	Corrupt Model	EPG	Georgia Tech	MathWorks	PNNL
J1	1	1	1	1	1	1
K1	0	0	0	0	0	0
J2	3	3	3	3	3	3
K2	0	0	0	0	0	0
Vsi1max	2	2	2	2	2	2
Vsi1min	-2	-2	-2	-2	-2	-2
Tw1	**2**	**5**	**2**	**5**	**5.512**	**2**
Tw2	**2**	**5**	**2**	**5**	**5.511**	**2**
Vsi2max	2	2	2	2	2	2
Vsi2min	-2	-2	-2	-2	-2	-2
Tw3	2	2	2	2	2.334	2
Tw4	0	0	0	0	0	0
T6	0	0	0	0	0.001	0
T7	2	2	2	2	2.517	2
Ks2	0.46	0.46	0.46	0.46	0.602	0.4623
Ks3	11	1	1	1	1	1
T8	0.5	0.5	0.5	0.5	0.316	0.5
T9	0.1	0.1	0.1	0.1	0.125	0.1
N	1	1	1	1	1	1
M	5	5	5	5	5	5
Ks1	50	10	50	10	12.975	50
T1	0.5	0.5	0.5	0.5	0.398	0.5
T2	5	5	5	5	0.741	5
T3	0.2	0.2	0.2	0.2	0.314	0.2
T4	0.02	0.02	0.02	0.02	0.007	0.02
T10	0.08	0.08	0.08	0.08	0.158	0.08
T11	0.02	0.02	0.02	0.02	0.005	0.02

Conclusions

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R	0.05	0.05	0.05	0.05	0.044	0
Rselect	1	1	1	1	1	1
Tpelec	0.01	0.01	0.01	0.01	0.01	0.01
Maxerr	9.05	9.05	9.05	9.05	9.05	9.05
Minerr	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05
Kpgov	20	20	20	20	3.395	13
Kigov	0	0	0	0	0.001	0
Kdgov	0	0	0	0	0	0
Tdgov	0.05	0.05	0.05	0.05	0.031	1
Vmax	1	1	1	1	1	1
Vmin	0.1	0.1	0.1	0.1	0.1	0.1
Tact	0.5	0.5	0.5	0.5	0.477	0.5
Kturb	1	1	1	1	1	1
Wfnl	0.01	0.01	0.01	0.01	0.025	0.01
Tb	10	10	10	10	22.059	12
Tc	0.3	0.3	0.3	0.3	0.179	1
Flag	0	0	0	0	0	0
Teng	0	0	0	0	0	0
Tfload	0.3	0.3	0.3	0.3	0.172	0.3
Kpload	1	1	1	1	0.911	1
Kiload	3.3	3.3	3.3	3.3	1.65	3.3

Conclusions

- Possible to get a good match without getting actual parameters correct
- Calibration needs engineering judgment applied, not just curve fitting techniques
- Understanding parameter sensitivities is critical
- Minimal changes to parameters could get you most the way
  - Focus on parameters with strong sensitivity
  - No need for changing vast majority of parameters
- Calibration can aid in identifying potential issues that should be addressed with coordination between TP and GO

Questions?