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GENQEJ Proposal

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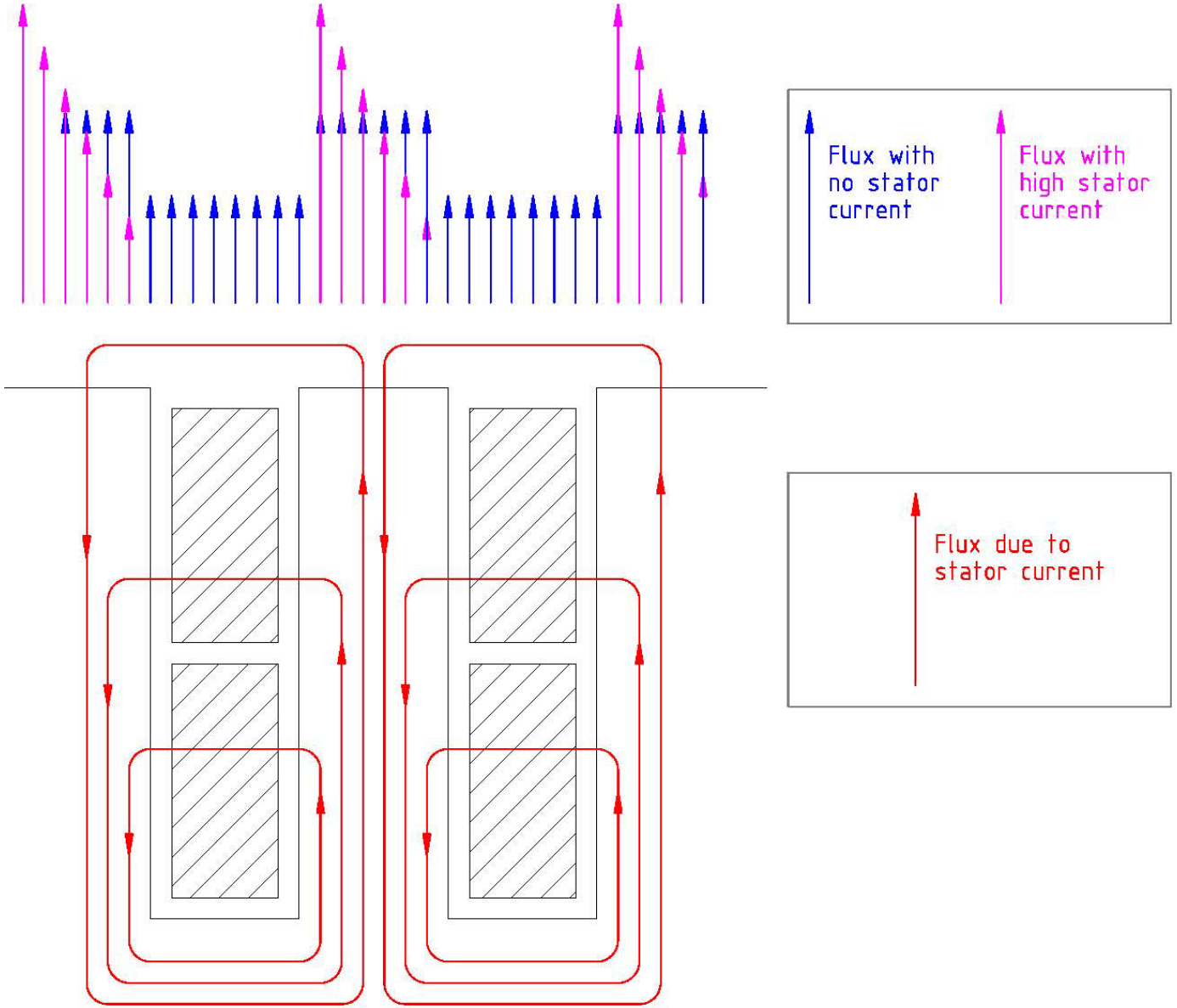
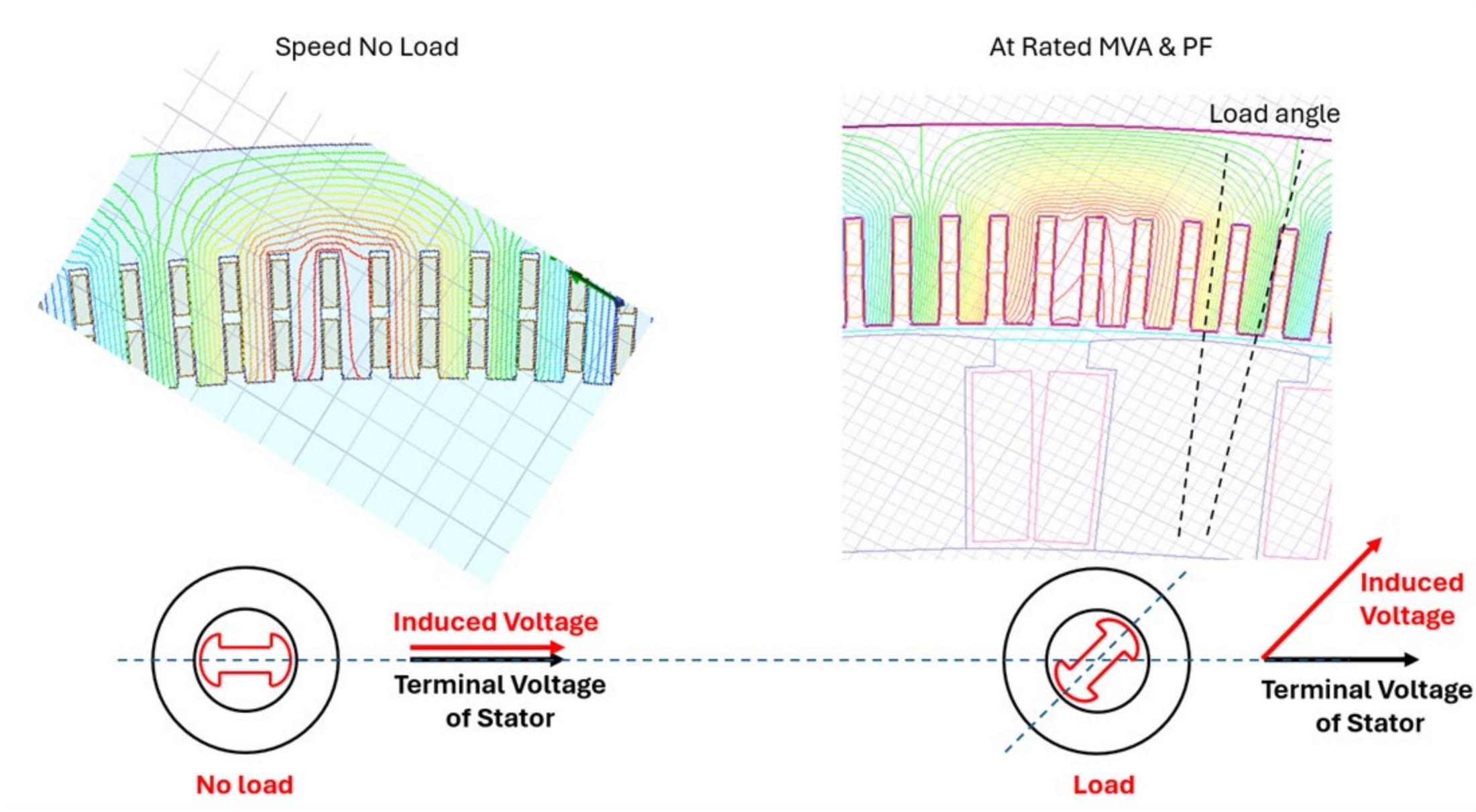
Background/Summary

- In September MVS Meeting a presentation was done on the stability and benefit of the representation of flux by GENQEJ using Kis. In that presentation it was shown that the dynamic stability of the model as well as current interaction stability of the model was comparable to what is existing in GENWEC.
- During that meeting it a motion was made for the approval of GENQEJ vote.
- Since that presentation more cases have been run with GENQEJ which show acceptable stability as well as good correlation with test data.
- Below is the documentation and basis for GENQEJ for your consideration.



Stator current distorts the flux distribution in many parts of the machine. For example, in this illustration the flux profile across the center tooth is uniform when there is no stator current (blue) and is distorted when stator current is present (magenta). Stator current increases the degree to which saturation affects the flux crossing the air gap.


Speed No Load
At Rated MVA & PF
Load angle
Induced Voltage
Terminal Voltage of Stator
No load
Induced Voltage
Terminal Voltage of Stator
Load

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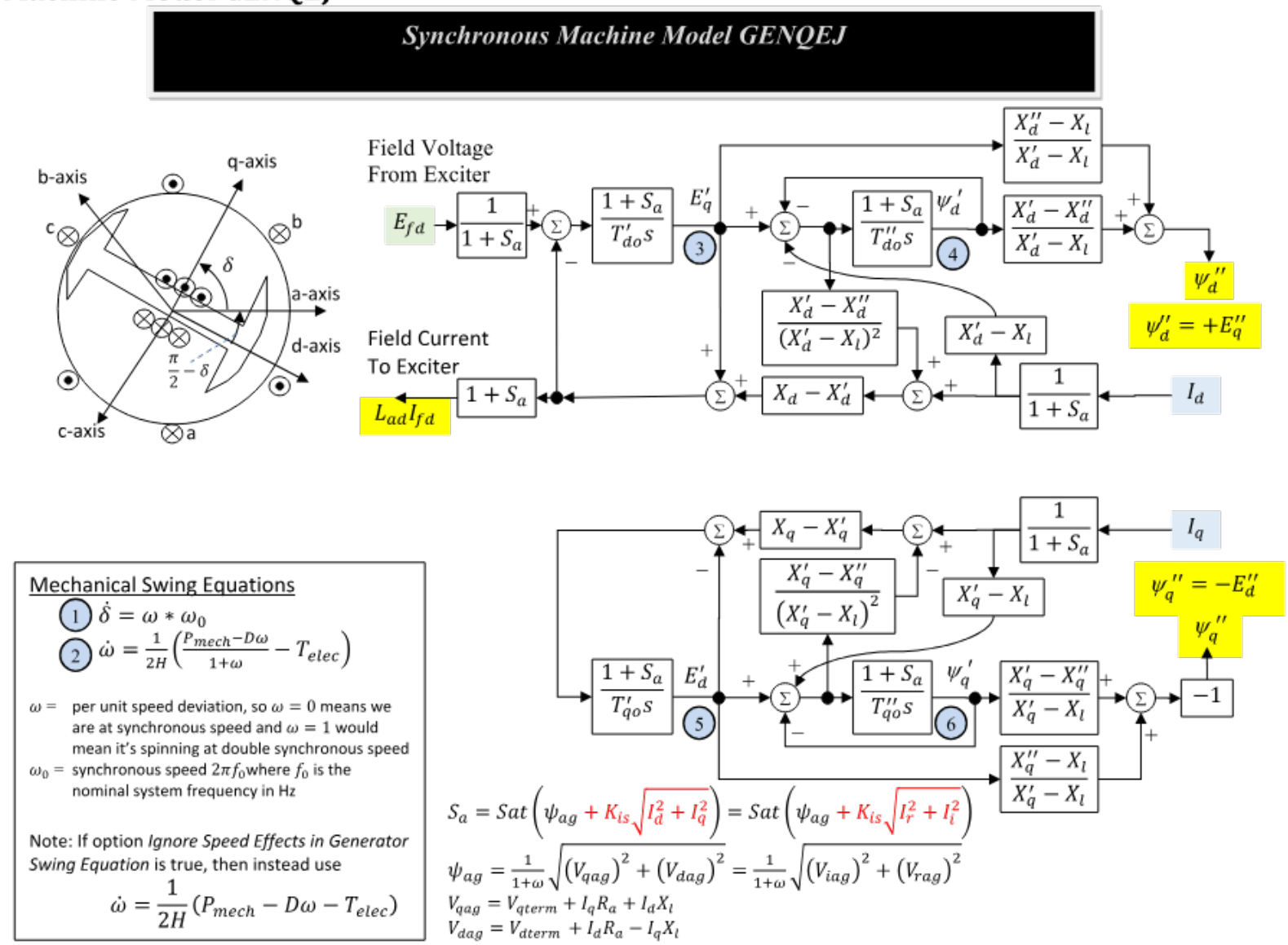
GENQEJ matches the dynamic of GENQEC but makes a different approximation of saturation effects using Kis.

Machine Model GENQEJ



https://www.powerworld.com/WebHelp/Default.htm#TransientModels_HTML/Machine%20Model%20GENQEJ.htm

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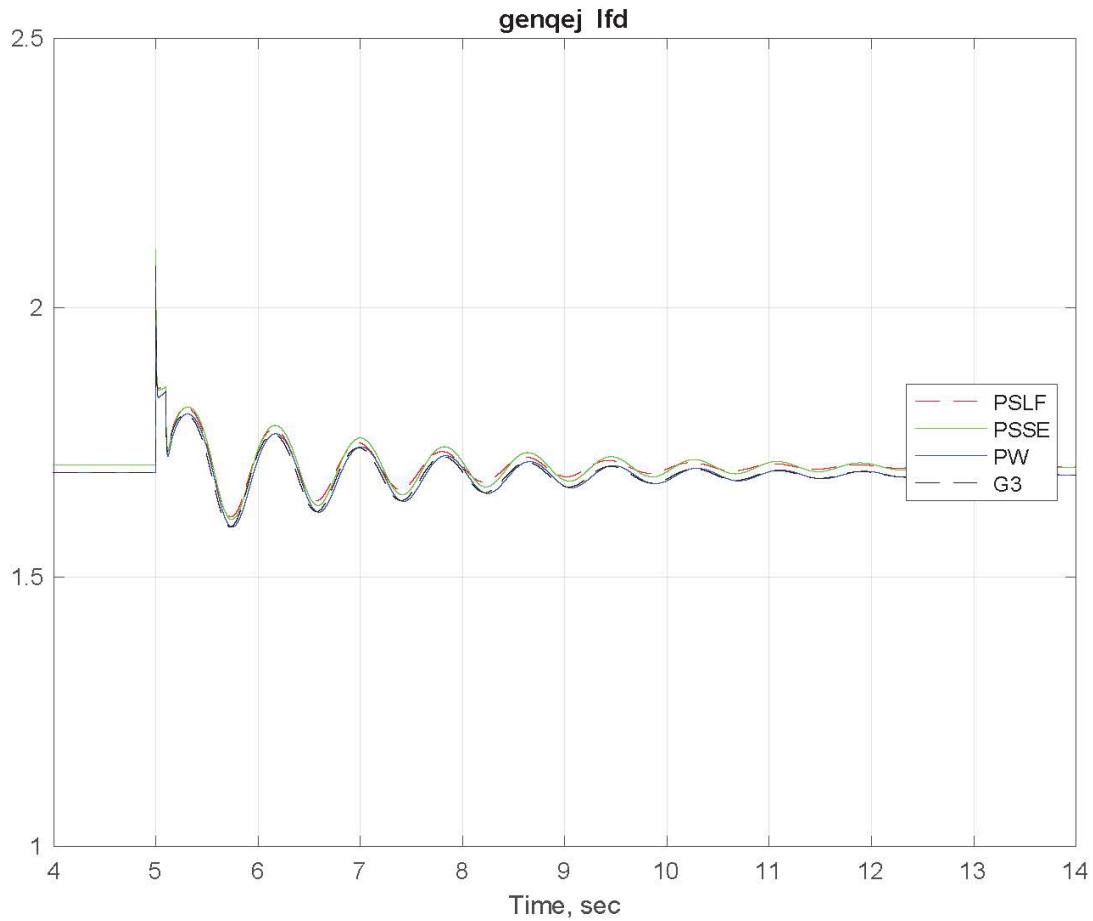
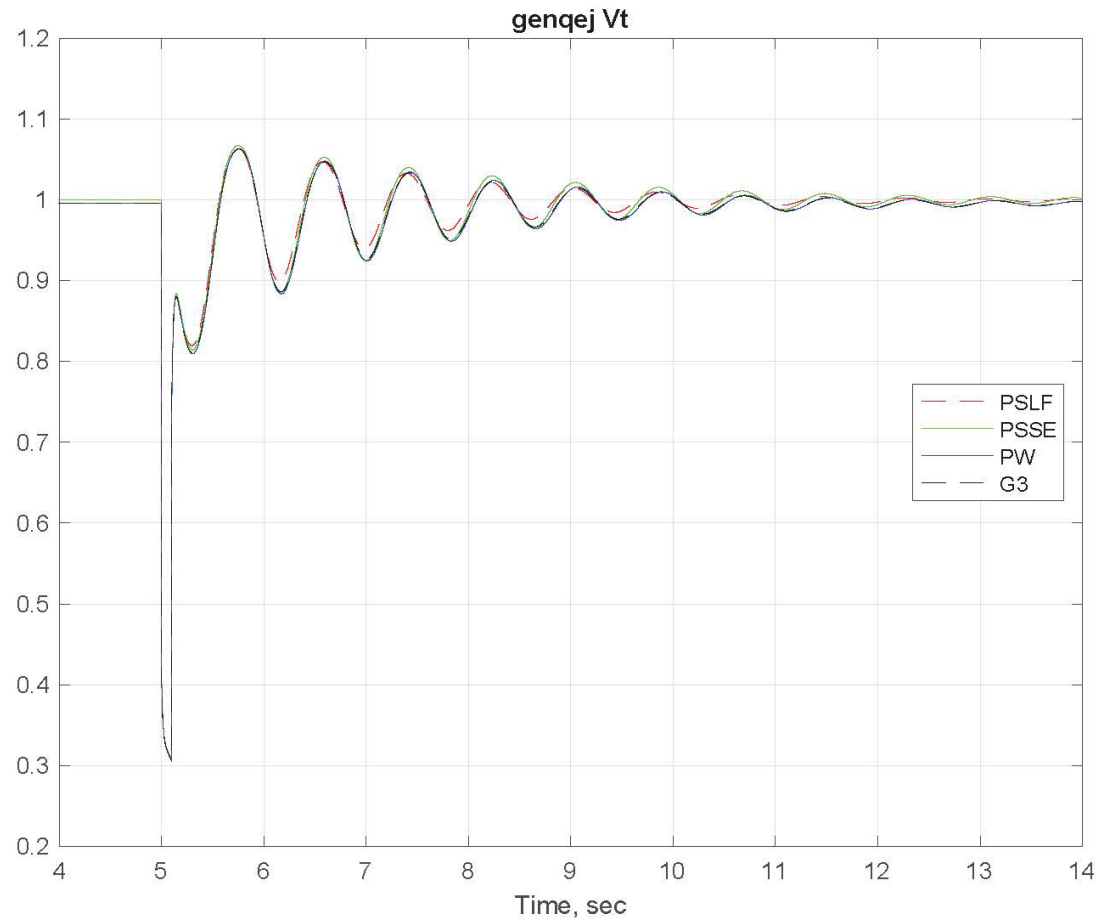
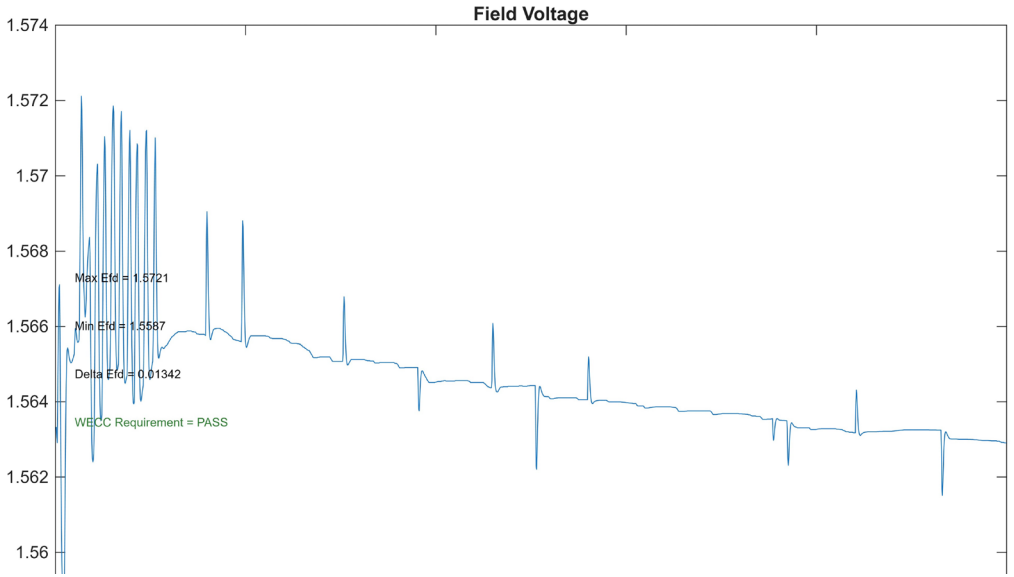


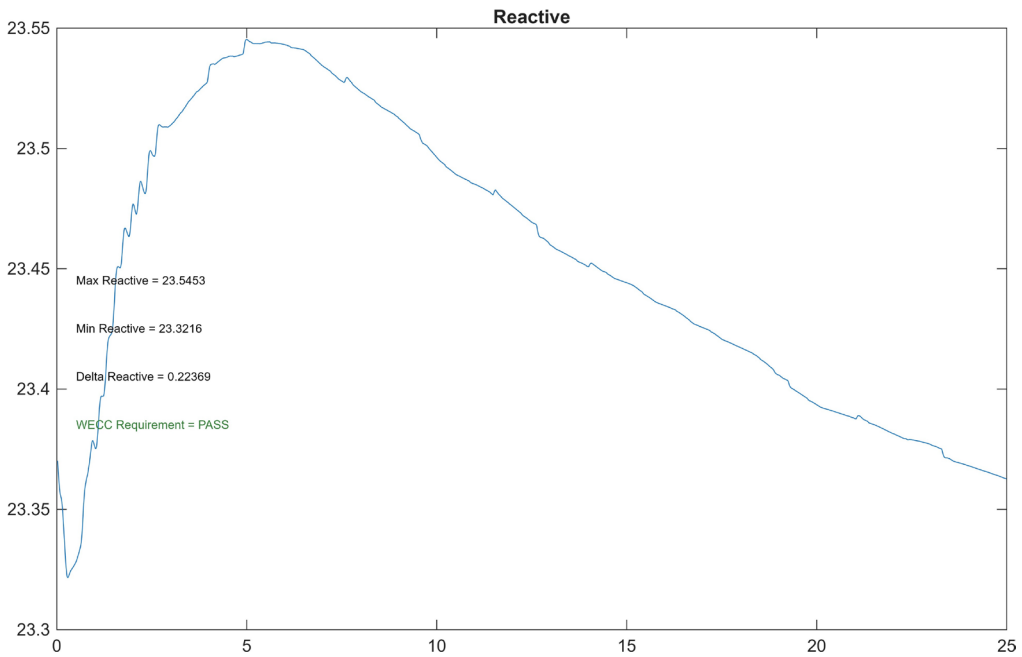


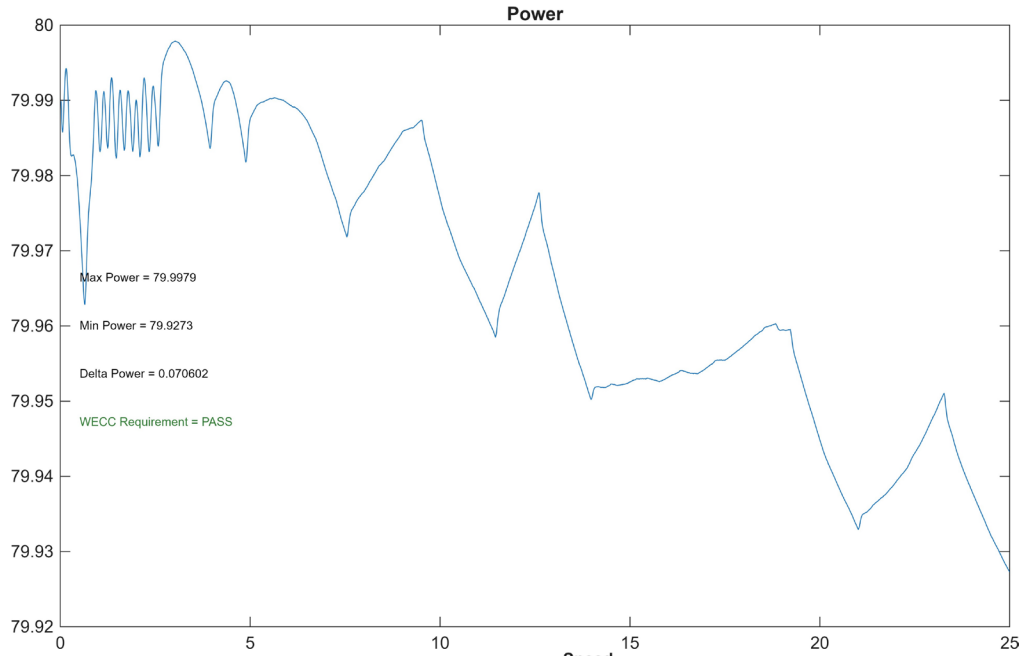
PSLF, PSSE, and Power World have all implemented the model and made it available in the current version. They have been baseline tested to confirm the implementations are consistent.

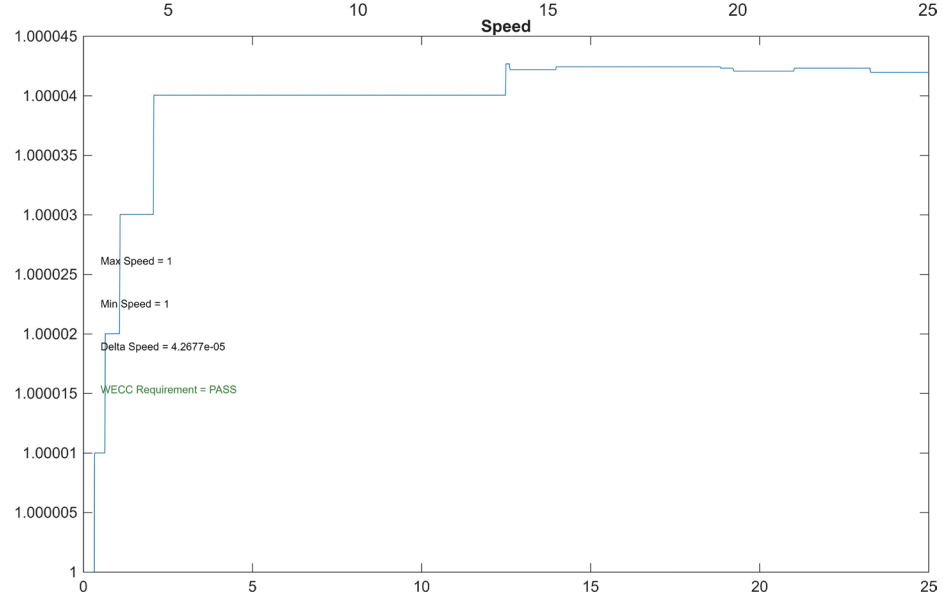
WECC Example

WECC Model Initialization



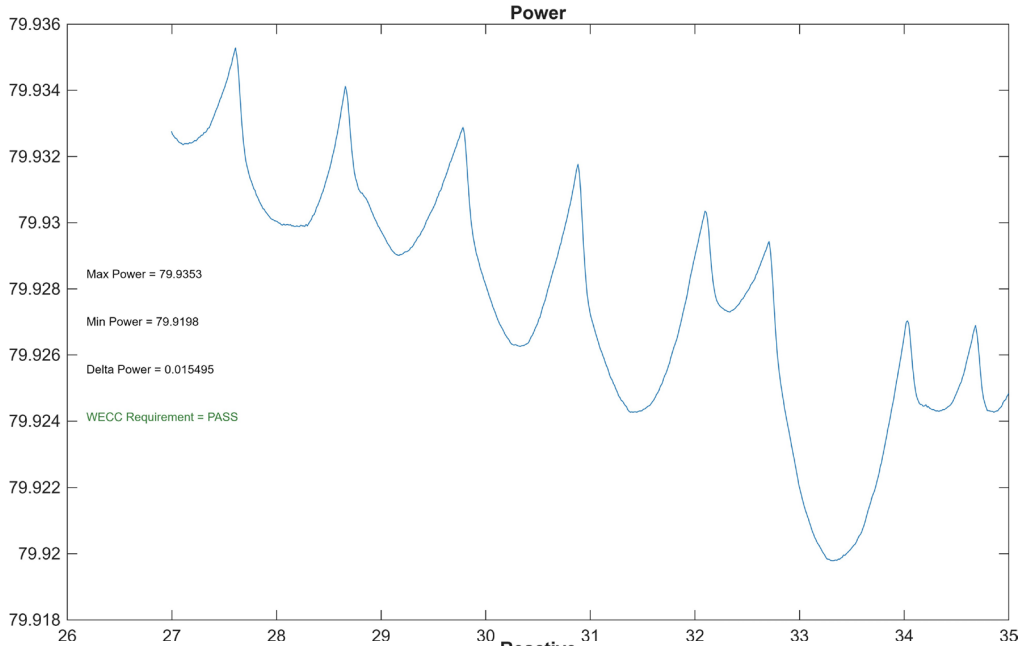


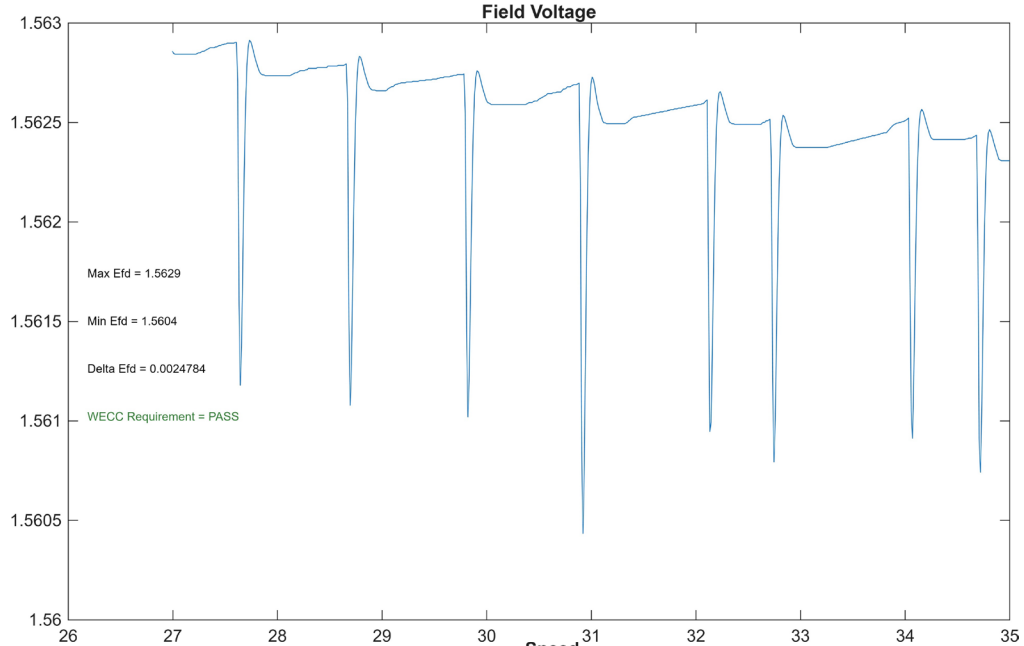


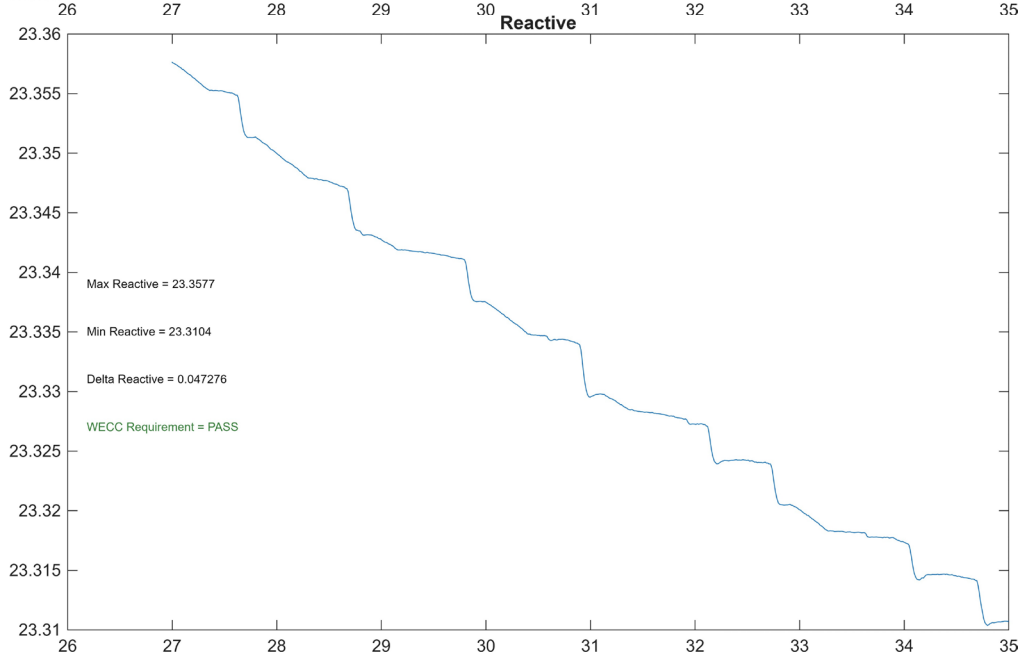


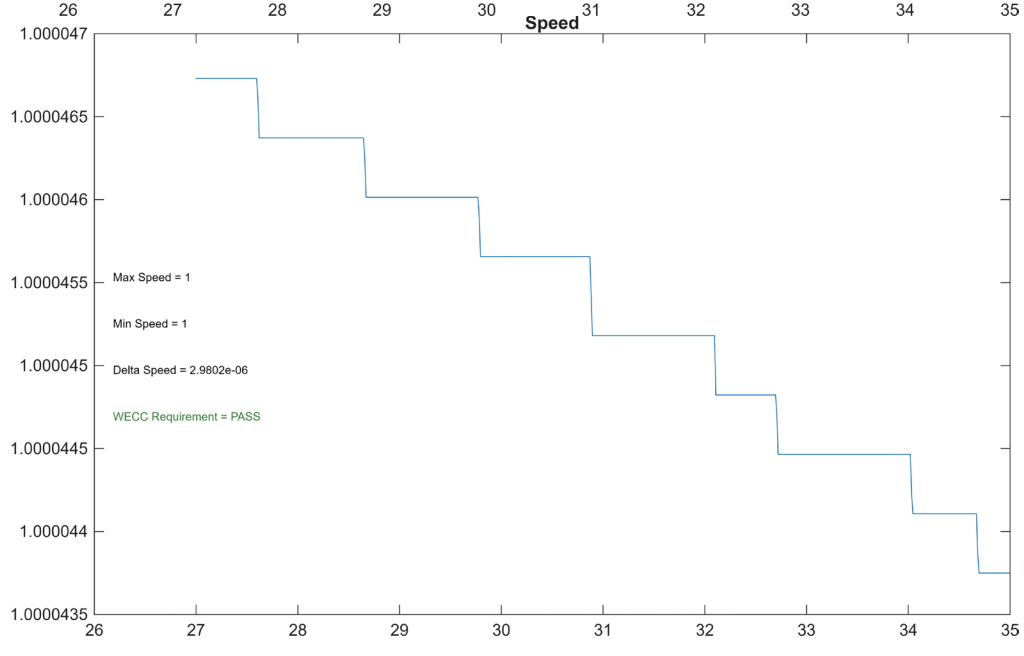
Modeled by: Yuriy Komlev (BOR)

WECC Model Stability









Conclusion and Notes on GENQEJ

- GENQEJ provides an alternative model that improves the steady state and dynamic simulations in comparison with recorded data for USACE most of the machines that we have tested.
- We have heard similar results in connection with 3600 and 1800 rpm machines.
- More examples are available for review.
- With more attention coming to the effects field current limits, minimizing error in steady state estimates are important and having an option for modeling that give use a better approximation of steady state field current is important.

Motion for Approval of GENQEJ

- We make a motion for the approval of GENQEJ as an acceptable model for WECC.