

Retirement Plan for GENTPJ Model from WECC Study Cases

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Introduction

Theoretical analysis and actual computer simulation results against the field measurements have revealed issues with GENTPJ model that were not recognized when the model was announced for wide-area adoption. There were also unresolved issues in generator model parameter validation with the GENTPJ model. A newer model, GENQEC has been developed and approved by the WECC Modeling and Validation Subcommittee (MVS) after successful implementation in and benchmarking across the commonly used commercial system study software in WECC's region.

To prevent further alteration to the generator model parameters in the WECC database, facilitate generator parameter validation, and improve simulation results of power system studies, it has been decided to retire the GENTPJ model from the WECC database.

The GENTPJ model—to be retired

GENTPJ model advantages

- Higher steady-state field current accuracy over the previous models in computer simulation
- Consideration of saturation effect on all stator and rotor inductance terms except leakage

GENTPJ model issues

- Dynamic response issue with less damping on electro-mechanical oscillations in simulation
- Direct conversion from previous model parameters to GENTPJ does not work well
- Difficulty in generator model parameter validation, especially on the GENTPJ-specific Kis

The GENQEC model—for future use

GENQEC model advantage

- Derived from IEEE Std 1110 second-order generator equivalent circuit
- Shares the same parameters as the previous models (GENROU, GENSAL, GENROE, GENSAE)
- Proven dynamic response compatible with previous second-order models used for decades
- Higher steady-state field current accuracy in computer simulation, same or better than GENTPJ
- Consideration of saturation effect on all stator and rotor inductance terms except leakage
- Clearly documented method for the GENQEC-specific parameter Kw

GENQEC model disadvantage (vs. previous second-order models)

• A unique compensation factor Kw in addition to generator parameters commonly provided by manufacturers



The retirement plan for GENTPJ model from WECC database

Generator mode revalidation with existing GENTPJ in WECC database

- Reports and model parameters re-validated in GENTPJ model will be accepted until December 31, 2023.
- No new report with GENTPJ model will be accepted as the MOD-026 submittal starting January 1, 2024.

Since GENTPF is the same as GENTPJ without the accuracy improvement of the field current, GENTPF will follow the same retirement plan.



Excerpt from WECC White Paper on GENQEC

Existing generator model migration to GENQEC

In the parameter conversion, the parameters in GENQEC are mapped one to one directly from the earlier second-order generator models, except those parameters explicitly marked below.

Round-rotor generator (GENROU, GENROE to GENQEC)



Salient-pole generator (GENSAL, GENSAE to GENQEC)



(For the GE PSLF program, the quadratic saturation model in GENROU and GENSAL may need to use SatFlag = 2 when converting to GENQEC. Using SatFlag=2 will still keep the same compatibility level between the Siemens/PTI PSS/E and GE PSLF using the previous models.)

