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**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

DL/T 1167-2019

Replacing DL/T 1167-2012

Guide for modeling generator excitation system

同步发电机励磁系统建模导则 清晰版

(English Translation)

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Foreword

This standard starts from the rules given in GB/T 1.1-2009 "Guidelines for Standardization Work Part 1: Standard Structure and Compilation" grass.

This standard replaces DL/T 1167-2012.

Compared with DL/T 1167-2012, the main technical changes of this standard are as follows except for editorial changes.

- Modified normative reference documents (see 2);
- Modified terms and definitions (see 3);
- The technical requirement that the three-phase fully-controlled bridge rectifier should adopt cosine phase shift is revised (see 5.1c);

- Refined the requirements for the finalization test of the excitation system model (see 5.2);
- Detailed requirements for the test interface and test function of the excitation system (see 5.3);
- Added the information and data required for excitation modeling (see 6a, 6g and 6i);
- Added the content of determining the reactive current compensation coefficient (see 8.5.1);
- Modified the content of checking the polarity of voltage difference rate (see 8.5.2);
- Added three measurement methods of reactive current compensation rate (see 8.5.3.3, 8.5.3.4, 8.5.3.5);
- The type of static excitation system is refined (see 9.2 c);
- Added provisions for TE value in the absence of field test identification data (see 9.4.2.4 d);
- Amended formulas (17), (18) and (21) (see 9.4.2.6 and 9.4.2.10);
- Added the content of "Voltage, current measurement and current compensation unit based on scalar multiplication and superposition" (see 9.6.2);
- Added PSS-NB power system stabilizer model (see 9.8);
- Added the way that the auxiliary control link of the excitation system acts on the voltage regulator (see 9.9);
- Added the test content of the generator direct-shaft transient open circuit time constant $d0T'$ (see 11.2);
- Refine the allowable value of deviation between simulation and actual measurement (see 11.3.4);
- Clarified the requirements for using actual measured values for URM_{AX} and URM_{IN} (see 11.4 d);
- Added the content of the small step disturbance test check of the generator load voltage (see 11.5);
- Modified the check conditions of the approximate calculation model (see 12.2);
- Modified the content and requirements of the check calculation of the generator load step response approximate calculation model (see 12.3.2);
- Added the requirement that the excitation modeling report should collect the original data related to the main transformer and excitation system (see 13.8 b and 13.8 g);
- Added the content of model parameter review and storage (see 14);

-Amended Appendix C (see Appendix C);

-Revise Appendix D to be a normative appendix (see Appendix D).

This standard was proposed by the China Electricity Council.

This standard is under the jurisdiction of the National Grid Operation and Control Standardization Technical Committee (SAC/TC446).

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Electric Power Research Institute.

1 Scope

This standard specifies the method for establishing the mathematical model of the excitation system of the synchronous generator for the stability analysis and calculation of the power system.

This standard is applicable to steam (gas) turbine generators, hydraulic turbine generators, pumped storage power plants/motors and nuclear power generators.

Magnetic system modeling.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version is suitable Used in this document. For undated references, the latest version (including all amendments) applies to this document.

GB/T 7409 (all parts) Synchronous motor excitation system
DL/T 583 Technical conditions of static rectification excitation system and device for large and medium hydro-generator
DL/T 843 Technical conditions for excitation system of large turbo-generator
DL/T 1391 Digital automatic voltage regulator network performance testing guidelines
DL/T 1767 Technical requirements for auxiliary control of digital excitation regulator

3 Terms and definitions

The following terms and definitions apply to this standard.

Primary model

The structure and parameters of the model provided by the manufacturer or derived from the information provided by the manufacturer.

Measured model

The actual model structure and parameters obtained after actual measurement of the model and parameters with reference to the original model.

Calculating model

Model structure and parameters for stable calculation.

a) Identical calculating model-consistent with the measured model structure, verified by simulation Recognize the calculation model structure and parameters that meet the requirements.

b) Approximate calculation model (similar calculating model)-there is a certain difference with the measured model structure, through calculation the model structure and parameters for stable calculation that basically meet the requirements after program simulation and parameter adjustment.

Voltage compensative ratio when the power factor of the generator is equal to zero, when the reactive current changes from zero to the rated stator current value, the generator end the rate of change of voltage, the voltage difference rate after the active and reactive load current compensator exits is called the natural voltage difference rate.

[GB/T 7409.1-2008, general rule 2.21] 3.5 Reactive current compensative ratio and reactive current compensative ratio and reactive current compensative coefficient (According to the description of the effect) The increment of the voltage adjustment rate due to the input of the reactive current compensator is the reactive current compensation rate, the corresponding compensation control parameter is called the reactive current compensation coefficient.

Step test

A step change test of the set value of the controlled quantity.

Step value

In the step test, the difference between the final steady-state value of the controlled quantity and the initial value.

Overshoot