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Generator Subtransient  
Reactance Prediction

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## **Synchronous Generator Subtransient Reactance Prediction**

The sub-transient reactance of a generator set is used to calculate the maximum available short circuit current for selecting circuit breakers with adequate interrupting rating. Since

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nearly all of the generator impedance is reactance, addition of the DC component for the first few cycles may almost double the symmetrical value of current.

## **Calculating generator reactances - Cummins Inc.**

For synchronous 3 phase electrical

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generator machine design, the ability to predict the subtransient reactance of a particular machine design is of prime importance. The subtransient reactance has a significant impact on the magnitude of the fault currents generated within the machine during an event such

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## **Synchronous Generator Subtransient Reactance Prediction**

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Abstract For synchronous 3 phase electrical generator machine design, the ability to predict the subtransient reactance of a particular machine design is of prime importance. The subtransient reactance has a significant impact on



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the magnitude of the fault currents generated within the machine during an event such as a 3 phase short-circuit.

## **Synchronous Generator Subtransient Reactance Prediction**

...

The subtransient reactance is a transient effect that's directly related to the

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electromagnetic relationships between the various physical components of the generator. Although the resistance of the windings of a synchronous generator are generally negligible compared to their reactance, they do play a role in the decay rates of the transient currents in the form of  $L/R$  time constants.

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## **An explanation of the origin of a generator's subtransient ...**

Synchronous generator reactance prediction using FE analysis . By Petr Chmelíček. ... For calculation of transient and subtransient parameters, four different methods are proposed and they are evaluated with respect to the accuracy and computation time. Final

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section describes basic test procedures for synchronous machine equivalent circuit ...

## **Synchronous generator reactance prediction using FE ...**

Chmelicek, P. Synchronous generator reactance prediction using FE analysis, Brno: Vysoke uceni Technicke v Brne,

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Fakulta Elektrotechniky a Komunikacnich  
Technologii, 2010. 62 s, Vedouci  
diplomove prace doc.Ing. Cestmir  
Ondrusek, CSc.

## **SYNCHRONOUS GENERATOR REACTANCE PREDICITON USING FE ANALYSIS**

Determination of the Synchronous

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Reactance With the assumption of a linear magnetic circuit, the circuit model (per phase) of a synchronous machine is as given in Fig. 8.10c. If  $R_a$  is neglected, it then follows that

## **Determination of the Synchronous Reactance | EEGGUIDE.COM**

Reactance Application Guidance Notes:

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Technical Information from Cummins Generator Technologies AGN 034 - Alternator Reactance DEFINITION  
Periods Inherent to the design of an alternator are certain internal dynamic characteristics that influence the performance of the alternator under momentary and steady state load conditions. These

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## **AGN 034 Alternator Reactance - STAMFORD | AvK**

generator designs. It addresses basic electrical generation concepts, generator design and performance as well as voltage regulation. It is important to note that the information in this section applies, primarily, to



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synchronous generators. The term synchronous describes the relationship

## **GENERATOR SYSTEMS**

First: No, transient and subtransient reactance is not the same. Sub-transient refers to the first few cycles after the load of a generator has changed, while transient refers to the period of normally

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a few seconds until the system has stabilised. You can find several references on the net, such as this one:

## **How can I get the transient reactance of an induction machine?**

Appendix I A1.1 Salient pole machine parameters  
Direct axis parameters:  
Synchronous reactance  $X_d = 1.445$  p.u.

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Transient reactance  $X_{\sim} = 0.316$  p.u.

Subtransient reactance  $X_{\sim} = 0.179$  p.u.

Transient time constant  $T_{\sim o} = 5.26$  s

Subtransient time constant  $T_{\sim o} = 0.028$

s Quadrature axis parameters:

Synchronous reactance  $X_q = 0.959$  p.u.

Subtransient ...

## **First order predictive excitation**

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Synchronous Generator Subtransient  
Reactance Prediction Using Transient  
Circuit Coupled Electromagnetic  
Analyses & Odd Periodic Symmetry  
Joshua Lorenz, John T. Fowler

**How can I compute "direct axis  
subtransient inductance ...**

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Three-phase synchronous generators which convert mechanical energy into electrical energy are the main power sources of power systems. In this thesis a phase-domain synchronous generator model which is developed directly in the stator reference frame is presented. The electrical and mechanical parts of a three-phase synchronous generator are

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separately modeled by two different,  
sets of ...

## **Phase-domain synchronous generator model for transients ...**

When the power gradually increases, the  
current reduces passing through three  
characteristic periods: Subtransient  
(enabling determination of the closing

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capacity of circuit breakers and electrodynamic constraints), average duration, 10 ms; Transient (sets the equipment's thermal constraints), average duration 250 ms; Permanent (this is the value of the short-circuit current in steady state).

## **Calculating the short-circuit current**

# Get Free Synchronous Generator Subtransient Reactance Prediction **across the terminals ...**

for Synchronous Generator Modeling Practices and Applications in Power System Stability Analyses.” It should be noted that one of the Joint Working Group members, Charles Concordia, had made an interesting prediction in the discussion of his 1960 paper on solid cylindrical rotor synchronous machines.



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**IEEE Std 1110-1991) 1110 TM EEE  
Standards IEEE Standards ...**

Equivalent circuit of a synchronous generator Often, armature reactance and self-inductance are combined into the synchronous reactance of the machine:  $X X X SA V E jX I RI I A S A A$   
Therefore, the phase voltage is The

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equivalent circuit of a 3-phase synchronous generator is shown. The adjustable resistor  $R_{adj}$  controls

## **EE 340 Spring 2011**

the machine saturates, synchronous reactance falls. Synchronous reactance at a given field current (or excitation voltage) can be estimated from the

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gradient of the open circuit voltage and short circuit current curves.<sup>3</sup> The armature winding leakage reactance is caused by the flux in the armature winding caused by the armature (load) current, and its magnetic path is normally not saturated. Transient and Subtransient Reactance The generator will exhibit subtransient and

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## **Generator Specifications for Planning, Operations Planning ...**

Sub transient reactance The period immediately after a short circuit on the generator and lasting upto 2-3 cycles, is called sub transient period. The current during this period is highest and is determined by sub transient reactance.

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The value of sub transient reactance is about half of the leakage reactance.

## **What is the difference between subtransient and transient ...**

Reactance defined Understanding transient reactance Listed reactance per unit values (transient, subtransient,

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synchronous, negative sequence and zero sequence) are used extensively for comparison in gen set specification, but are also a source of confusion. This first part of a three-part series defines transient reactance.

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