基于 MATLAB 的发电机仿真实验

实验目的

1.学习运用 matlab 软件对发电机进行仿真短路试验。

2.对系统的稳态运行、单相短路、两相短路、三相短路进行比较分析。

3.对系统并网状态进行分析。
 实验内容

用 matlab 软件搭建一个发电机与负荷小系统模型, 仿真各种短路情况并对结果做进一步分析。

实验步骤

一、熟悉原件

熟悉 matlab 中 simulink 、simmechanics 、simpowersystems 等要用到的主要模块。了解模块中的各个原件。

二、建立模型

单机系统仿真图



(并网前)



(并网后)

三、选择模块

1.从simpowersystems-machines 中找到发电机simplified

synchronous machine si units 元件并复制到电路图中,双击发电机

元件,进行参数设置如下:

Block Para	ameters: Simplified Synchronous Machine SI Units
Simplified Synchron	nous Machine (mask) (link)
Implements a 3-pha internal voltage bel an internal neutral	ase simplified synchronous machine. Machine is modelled as an hind a R-L impedance. Stator windings are connected in wye to point.
Use this block if you	uwant to specify SI parameters.
Parameters	
Connection type:	3-wire Y
Mechanical input:	Mechanical power Pm
Nominal power, lin	e-to-line voltage, and frequency [Pn(VA) Vn(Vrms) fn(Hz)]:
[500e6 156e3 50]	
Inertia, damping fa	ctor and pairs of poles [J(kg.m^2) Kd(pu_T/pu_w) p()]
[56290 0.3 2]	
Internal impedance	: [R(ohm) L(H)]:
and the second	



2.从simulink-sources 选择常数发生器constant 元件,并复制到电路 图中,设置机械功率值为700e6,设置电压幅值为156e3。

3.从 Simpowersystems-measurements 选择三相电压-电流
测量 three-phase v-i measurement 元件,并复制到电路图中,设置参数如下:

🖬 📃 Block Pa	rameters: Three-Phase V-I Measurement 🛛 💦 🗙
- Three-Phase VI Measur	ement (mask) (link)
This block is used to me connected in series with ground voltages and lin	asure three-phase voltages and currents in a circuit. When h a three-phase element, it return the three phase-to- e currents.
The block can output th amperes. Check the app currents in pu	e voltages and currents in per unit values or in volts and propriate boxes if you want to output the voltages and
Parameters	
Voltage measurement	phase-to-ground
Use a label	
Voltage in pu	
Current measurement	yes 🔹
Use a label	



4.从 Simpowersystems-elements 中选择传输线路

distributed parameters line 元件,并复制到电路图中,设置参数

如下:(线路1与线路2设置参数相同)

	Block Parameters: Parameters Line2	×
Distributed Par	ameters Line (mask) (link)	~
Implements a N parameters are	I-phases distributed parameter line model. The R.L. and C line specified by [NxN] matrices.	
To model a two complete [NxN] positive and zer transposed line line (2 coupled	-, three-, or a six-phase symmetrical line you can either specify matrices or simply enter sequence parameters vectors: the to sequence parameters for a two-phase or three-phase e, plus the mutual zero-sequence for a six-phase transposed 3-phase lines).	
Parameters		#11 [注:
Number of phas	ses N	
3		
Frequency used	for R L C specification (Hz)	
50		
Resistance per	unit length (Ohms/km) [N*N matrix] or [R1 R0 R0m]	
[0.01273 0.386	4]	1
Inductance per	unit length (H/km) [N*N matrix] or [L1 L0 L0m]	
[0.9337e-3 4.1	264e-3]	2
Capacitance pe	r unit length (F/km) [N*N matrix] or [C1 C0 C0m]	

[12.74e-9 7.751e-9]			
Line length (km)				
200				
Measurements No	one			*
ſ	<u>о</u> к	<u>C</u> ancel	Help	Apply
			A DESCRIPTION OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER OWNE OWNER OWNER OWNER OWNE OWNER OWNER OWNER OWNER OWNER OWNE OWNE OWNER OWNE OWNER OWNE OWNER OWNE OWNER OWNE OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNE OWNER OWNER OWNER OWNER OWNE OWNER OWNER OWNER OWNE OWNE OWNE OWNE OWNE OWNE OWNE OWNE	

5.从 Simpowersystems-elements 中选择三相电路短路故障发生器

three-phase fault 元件,并复制到电路图中,参数设置如下:

Block Parameters: Three-Phase Fault	×
Three-Phase Fault (mask) (link)	^
Use this block to program a fault (short-circuit) between any phase and the ground. You can define the fault timing directly from the dialog box or apply an external logical signal. If you check the 'External control' box , the external control input will appear.	
Parameters	
Phase A Fault	
Phase B Fault	
Phase C Fault	
Fault resistances Ron (ohms) :	E
0.001	1
Ground Fault	
Ground resistance Rg (ohms) :	
0.001	
External control of fault timing :	
Transition status [1,0,1):	
[1 0]	
Transition times (s):	
[0.2 0.3]	
Snubbers resistance Rp (ohms) :	
1e6	1
	~
OK Cancel Help	Apply

6.从 Simpowersystems-elements 中选择三相断路器

three-phase breaker 元件,并复制到电路图中,参数设置如下:

	Block Parameters: Breaker	×
Three-Phase Breaker (mas Connect this block in serie you want to switch. You ca from the dialog box or app check the 'External contro- will appear.	sk) (link) es with the three-phase element an define the breaker timing directly ply an external logical signal. If you pl' box, the external control input	^
Parameters		
Initial status of breakers	closed ~	
Switching of phase A		
Switching of Phase B		
Switching of phase C		
Transition times (s)		Ľ
[0.01 0.3]		
External control of sw	itching times	
Breakers resistance Ron ((ohms)	
0.001		
Snubbers resistance Rp (Ohms)	
1e6		



7.从 Simpowersystems-elements 中选择三相变压器
three-phase transformer(two windings) 元件,并复制到电路图中,
参数设置如下:

Block Parameters: Three-Phase Transformer (Two Wir	idings)	×
Three-Phase Transformer (Two Windings) (mask) (link)		^
This block implements a three-phase transformer by using three sin transformers. Set the winding connection to 'Yn' when you want to neutral point of the Wye.Click the Apply or the OK button after a change to the Units popup the conversion of parameters.	gle-phase access the to confirm	
Configuration Parameters Advanced		214 214
Units pu	×	
Nominal power and frequency [Pn(VA) , fn(Hz)]		
[250e6,50]		
Winding 1 parameters [V1 Ph-Ph(Vrms), R1(pu), L1(pu)]		÷
[424.35e3, 0.002, 0.08]		
Winding 2 parameters [V2 Ph-Ph(Vrms), R2(pu), L2(pu)]		
[315e3,0.002,0.08]		
Magnetization resistance Rm (pu)		
500.		
Magnetization inductance Lm (pu)		
500		
Saturation characteristic [i1 , phi1 ; i2 , phi2 ;] (pu)		
[0 0;0.0024 1.2;1 1.52]		
Initial fluxes [phi0A , phi0B , phi0C] (pu):		v
<u>O</u> K <u>C</u> ancel <u>H</u> elp	Apply	

8.从 Simpowersystems-elements 中选择三相串联 rlc 负载 three-phase series rlc load 元件,并复制到电路图中,参数设置如

下:

В	lock Parameters: Three-Phase Parallel RLC Load1 🛛 🛛 🗙
Three-Phase P	arallel RLC Load (mask) (link)
Implements a t	three-phase parallel RLC load.
Parameters	
Configuration	Y (grounded)
Nominal phase	e-to-phase voltage Vn (Vrms)
1000	
Nominal frequ	ency fn (Hz):
50	
Active power F	• (W):
50e3	
Inductive react	tive Power QL (positive var):
0	
Capacitive rea	ctive power Qc (negative var):
0	
Measurements	None
	OK Cancel Help Apply

!

9.从 Simpowersystems-measurements

中选择 multimeter ,

并将它们复制到电路图中。

10.从 Simpowersystems-electrical sources 中选择 three-phase source ,并将它们复制到电路图中,参数设置如下:

以上内容仅为本文档的试下载部分,为可阅读页数的一半内容。如 要下载或阅读全文,请访问: <u>https://d.book118.com/81813210601</u> 4007007