

Transient Stability Analysis with PowerWorld Simulator



T2: Transient Stability Data Management



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Transient Stability Data Management



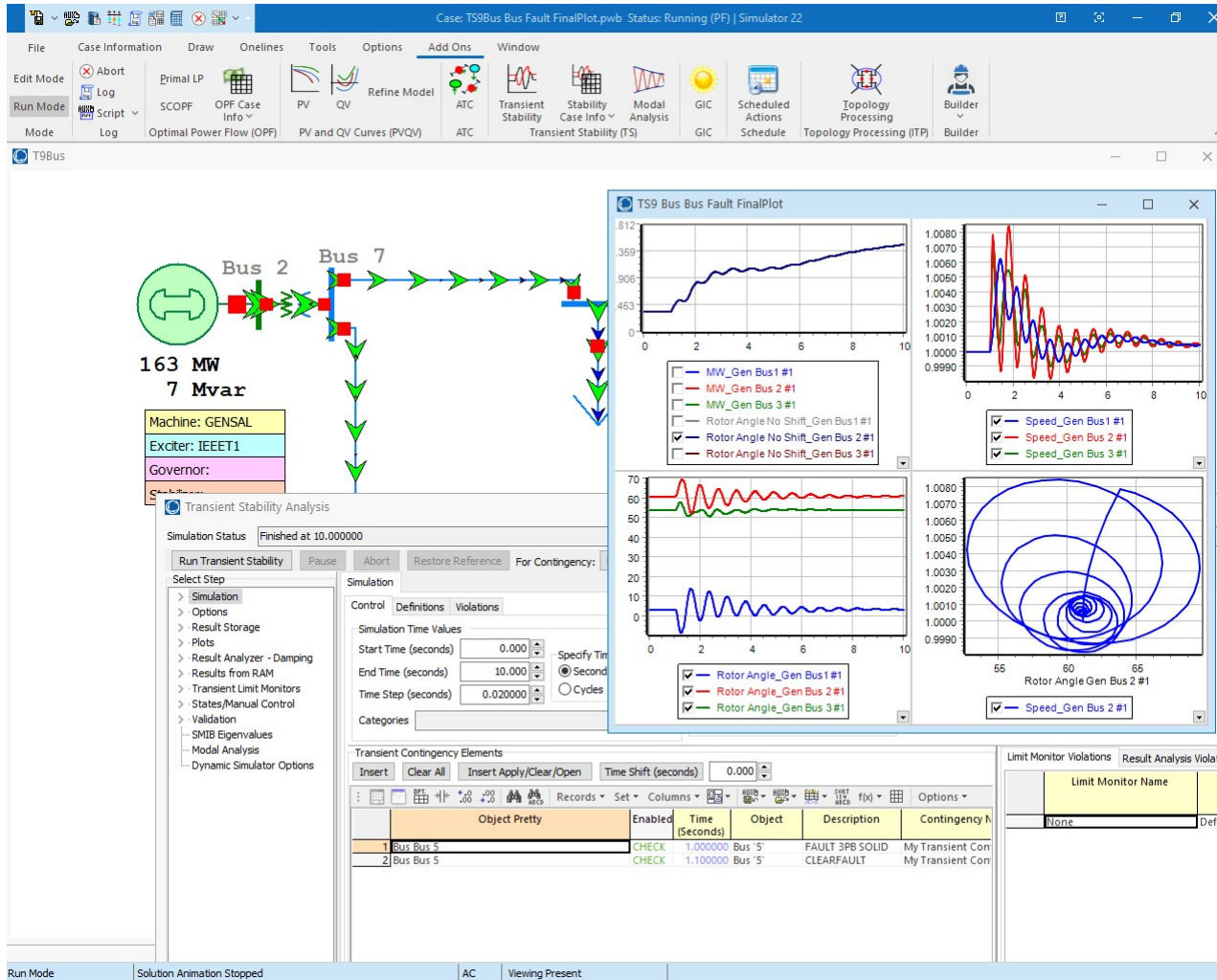
- The Transient Stability tool makes it possible to deal with a large amount of input data (and result data, discussed later)
- Reading/writing to various file formats
 - Input data can be used to define the dynamic models of the system as well as the steady-state model of the system
 - Simulator also makes it easy to save out transient stability information to files
- Navigating available models
 - Model explorer
 - Stability tab of dialog for individual models
- Additional resources are available, including
 - Block diagrams
 - Simulator Help documentation

Design Philosophy



- PowerWorld's design philosophy is to make power system analysis as easy as possible
 - This holds true in the transient stability domain. Our goal is to reduce the entry barrier to allow more power system professions access to transient stability.
- As much as possible we have leveraged our existing methods for data interaction
- Transient stability data augments the power flow model data

Example: Running Transient Stability on the B7Flat Case



Our Philosophy:
While doing transient stability solutions on large cases can certainly require large amounts of engineering expertise, the barriers of entry in learning to do such studies should not arise because of the software.

External Data Files

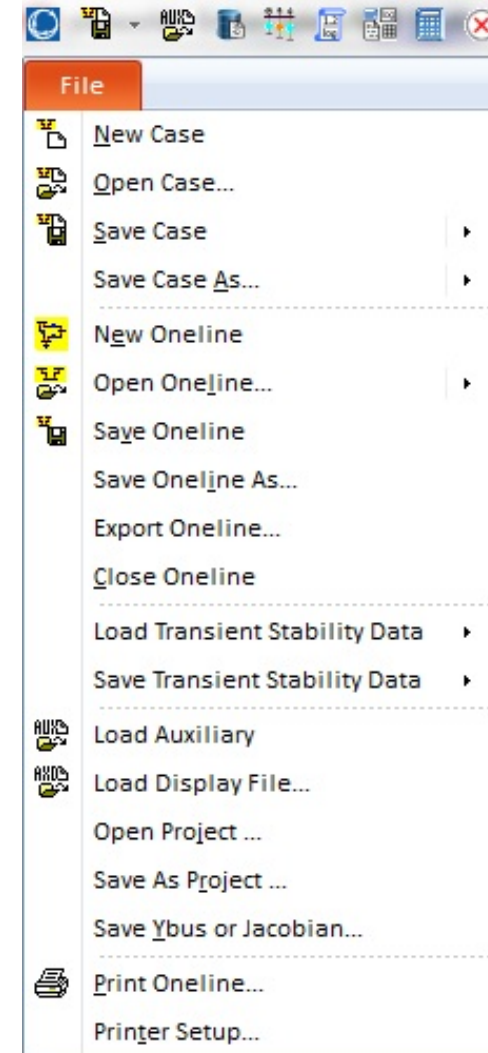


- A particular pwb case may or may not already have dynamic models saved in it, and there must be at least one model to do a transient stability simulation
- Models may be read in from an input file or manually entered
- Several external file types including
 - PowerWorld Auxiliary File (AUX)
 - PTI File (DYR)
 - GE File (DYD)
 - BPA File (SWI)
- PowerWorld Simulator can **read** and **write** Transient Stability data to these formats
- Only models that are available in the specific format can be saved back into that format

External Data Files



- Access for loading and saving these files can be found in several places within Simulator
- Application File Menu by clicking the PowerWorld icon in the top left corner of Simulator
- At the bottom of the specific model pane in the Transient Stability portion of the Model Explorer
- Stability Case Info Menu buttons
- Transient Stability Dialog buttons

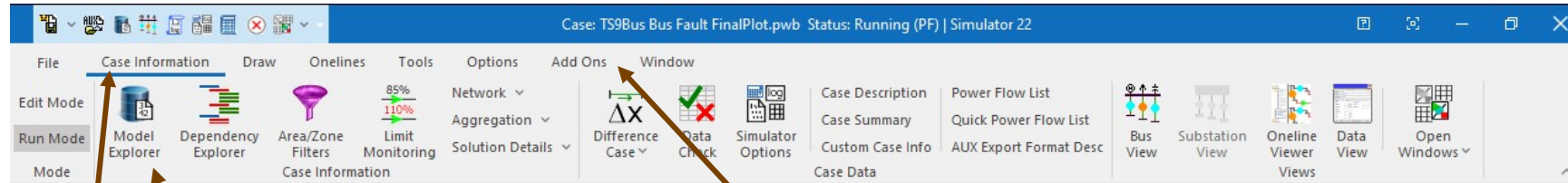


Auxiliary Files (AUX)



- The ability to use AUX files exists throughout Simulator, and it is something that is supported by Transient Stability as well
- Another training course covers AUX files in more detail
- Save to Auxiliary
 - Store any results and settings that need to be retained for future use
 - Easily loaded into different power flow cases
- Load Auxiliary
 - Load relevant option settings to be used during the transient stability analysis
 - Can load the same AUX file into many cases
- Transient-stability specific results and options can also be saved with the pwb case

Transient Stability Case Information and Model Explorer



Model Explorer from Case Information Toolbar

Stability Case Info, Case Information from Add-Ons Toolbar

Transient Stability -
Opens the Transient Stability Analysis Dialog

Case Information -
Opens the Model Explorer to the appropriate page

Transient Stability Summary

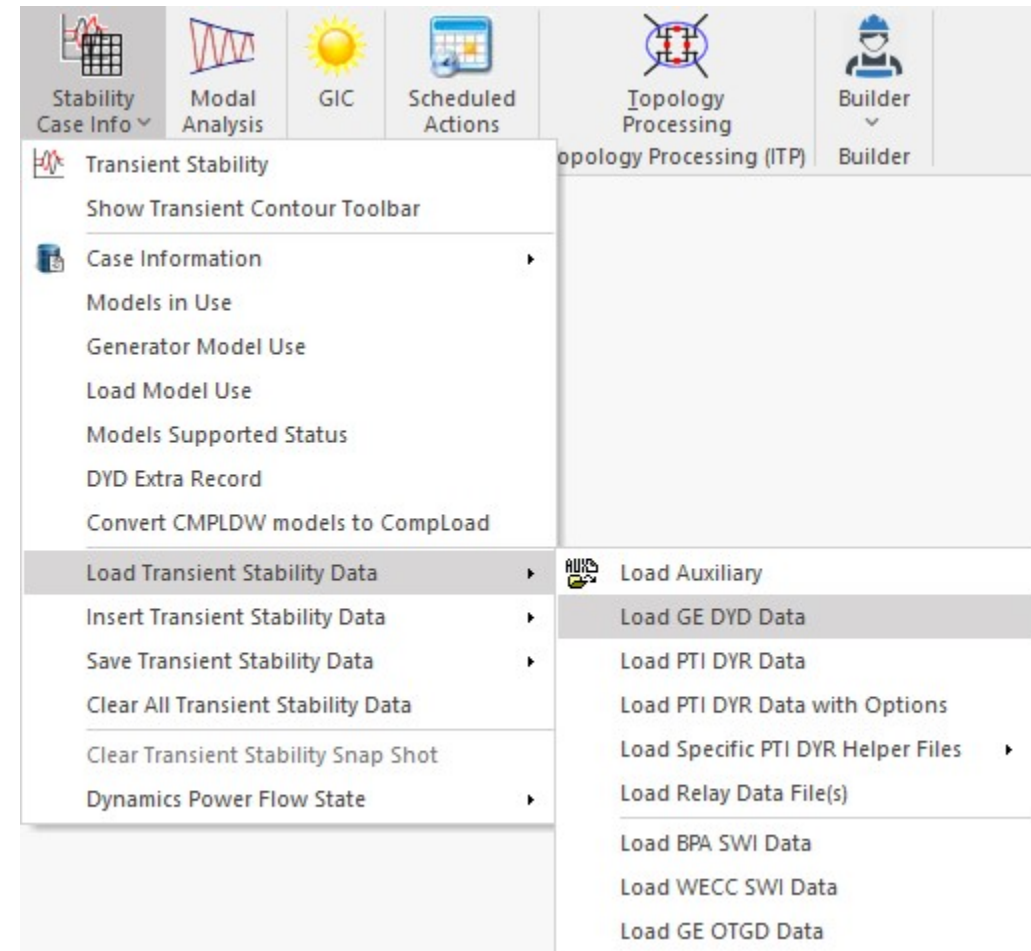
Load/Save Transient Stability Data

Make the Transient Contour Toolbar visible

Example: Loading Data from External File Formats



- Open **WestExample.epc**
- This contains power flow model data
- Go to “Load Transient Stability Data” and “Load GE Data” from the Stability Case Info drop down menu on the main ribbon
- Load in **WestExample.dyd**
- This contains dynamic model data



GE DYD Special Handling: Cross-Compound Units



- Cross-compound units are two generators that both operate off the same steam plant
- Often represented in a DYD file
 - 2 machine models
 - 2 exciters
 - 2 stabilizers
 - 1 governor which is either **IEEEG1** or **CRCMGV**
- Ideally, the power flow model represented by the EPC file will model these two generators separately and will easily link to the DYD models

GE DYD Special Handling: GENCC model



- The **GENCC** model is often modeled as one generator but signals that two generators in the DYD file may be represented by one in the EPC file
- When this situation is found, Simulator will automatically split the existing generator into two
 - An appropriate log message will be written
- Parameters $Pfac$ and $Qfac$ determine the percentage of MW and MVA_r assigned to each of the two generators

Example: Loading Data from External File Formats



- Informational messages, warnings, and errors created by reading in the data will appear in the log
- Save the case as **WestExample.pwb** for future use

Messages related to the splitting of the GENCC models

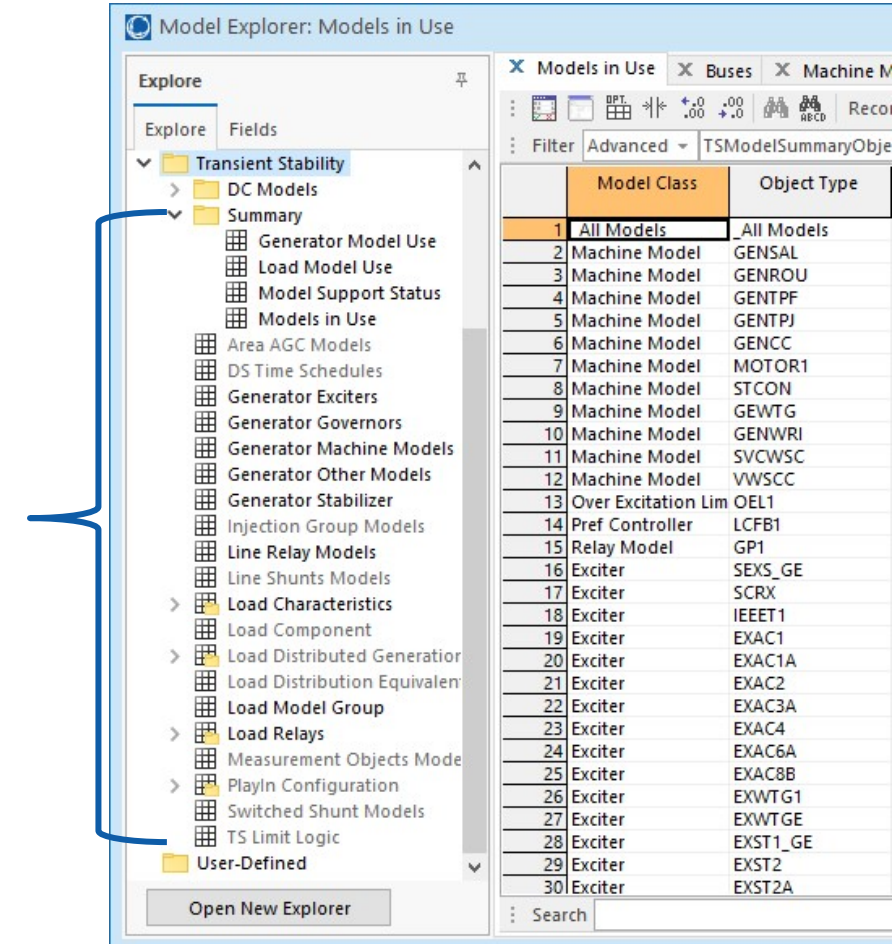
```
Validation of G:\pw\version.210\Training\Training Cases\Transient Stability\WestExample.epc ended at December 03, 2021 14:34:53
Initializing Solution Data Structures
Initialization Complete
Reading DYD GE Data Format
Changing Machine Saturation Approach when S12 < S10 to Match PSFLF Approach of Ignoring Saturation
Changing Saturation When One SE Value Zero to Set to Zero
Info: New generator created at FCNGN4CC (14914) #L and existing generator ID changed to #H because 2 GENCC records found for Bus FCNGN4CC (14914) with IDs "H" and "L", but only one g
Info: New generator created at FCNGN5CC (14915) #L and existing generator ID changed to #H because 2 GENCC records found for Bus FCNGN5CC (14915) with IDs "H" and "L", but only one g
Info: New generator created at ALAMT3 G (24003) #L and existing generator ID changed to #H because 2 GENCC records found for Bus ALAMT3 G (24003) with IDs "H" and "L", but only one g
Info: New generator created at ALAMT4 G (24004) #L and existing generator ID changed to #H because 2 GENCC records found for Bus ALAMT4 G (24004) with IDs "H" and "L", but only one g
Info: New generator created at ALAMT5 G (24005) #L and existing generator ID changed to #H because 2 GENCC records found for Bus ALAMT5 G (24005) with IDs "H" and "L", but only one g
Info: New generator created at ELSEG3 G (24047) #L and existing generator ID changed to #H because 2 GENCC records found for Bus ELSEG3 G (24047) with IDs "H" and "L", but only one g
Info: New generator created at ELSEG4 G (24048) #L and existing generator ID changed to #H because 2 GENCC records found for Bus ELSEG4 G (24048) with IDs "H" and "L", but only one g
Info: New generator created at MTNVIST3 (24052) #L and existing generator ID changed to #H because 2 GENCC records found for Bus MTNVIST3 (24052) with IDs "H" and "L", but only one g
Info: New generator created at MTNVIST4 (24053) #L and existing generator ID changed to #H because 2 GENCC records found for Bus MTNVIST4 (24053) with IDs "H" and "L", but only one g
Info: New generator created at HUNT1 G (24066) #L and existing generator ID changed to #H because 2 GENCC records found for Bus HUNT1 G (24066) with IDs "H" and "L", but only one g
Info: New generator created at HUNT2 G (24067) #L and existing generator ID changed to #H because 2 GENCC records found for Bus HUNT2 G (24067) with IDs "H" and "L", but only one g
Info: New generator created at MANDLY1G (24089) #L and existing generator ID changed to #H because 2 GENCC records found for Bus MANDLY1G (24089) with IDs "H" and "L", but only one g
Info: New generator created at MANDLY2G (24090) #L and existing generator ID changed to #H because 2 GENCC records found for Bus MANDLY2G (24090) with IDs "H" and "L", but only one g
Info: New generator created at MOHAV1CC (24095) #L and existing generator ID changed to #H because 2 GENCC records found for Bus MOHAV1CC (24095) with IDs "H" and "L", but only one g
Info: New generator created at MOHAV2CC (24096) #L and existing generator ID changed to #H because 2 GENCC records found for Bus MOHAV2CC (24096) with IDs "H" and "L", but only one g
Info: New generator created at REDON7 G (24123) #L and existing generator ID changed to #H because 2 GENCC records found for Bus REDON7 G (24123) with IDs "H" and "L", but only one g
Info: New generator created at REDON8 G (24124) #L and existing generator ID changed to #H because 2 GENCC records found for Bus REDON8 G (24124) with IDs "H" and "L", but only one g
Info: New generator created at ALAMT6 G (24161) #L and existing generator ID changed to #H because 2 GENCC records found for Bus ALAMT6 G (24161) with IDs "H" and "L", but only one g
Info: New generator created at HUNT3 G (24167) #L and existing generator ID changed to #H because 2 GENCC records found for Bus HUNT3 G (24167) with IDs "H" and "L", but only one g
Info: New generator created at HUNT4 G (24168) #L and existing generator ID changed to #H because 2 GENCC records found for Bus HUNT4 G (24168) with IDs "H" and "L", but only one g
Info: New generator created at HAYNES5G (26030) #L and existing generator ID changed to #H because 2 GENCC records found for Bus HAYNES5G (26030) with IDs "H" and "L", but only one g
Info: New generator created at PTSB 5 (33105) #L and existing generator ID changed to #H because 2 GENCC records found for Bus PTSB 5 (33105) with IDs "H" and "L", but only one generat
Info: New generator created at PTSB 6 (33106) #L and existing generator ID changed to #H because 2 GENCC records found for Bus PTSB 6 (33106) with IDs "H" and "L", but only one generat
Info: New generator created at C.COS 6 (33116) #L and existing generator ID changed to #H because 2 GENCC records found for Bus C.COS 6 (33116) with IDs "H" and "L", but only one generat
Info: New generator created at C.COS 7 (33117) #L and existing generator ID changed to #H because 2 GENCC records found for Bus C.COS 7 (33117) with IDs "H" and "L", but only one generat
Info: New generator created at MOSSLND6 (36405) #L and existing generator ID changed to #H because 2 GENCC records found for Bus MOSSLND6 (36405) with IDs "H" and "L", but only one g
Info: New generator created at MOSSLND7 (36406) #L and existing generator ID changed to #H because 2 GENCC records found for Bus MOSSLND7 (36406) with IDs "H" and "L", but only one g
```

WestExample.pwb

Transient Stability Case Information and Model Explorer



- Model Explorer contains a Transient Stability Folder
- The first item is the Summary sub-folder
- Also, pages are listed for each class of available model
- The same options and Model Explorer pages can also be accessed from the Stability Case Info menu



Navigating Available Models



Model Explorer lists the supported models

Model Explorer: Generator Machine Models

Explore

Fields

Transient Stability

DC Models

Summary

Generator Model Use

Load Model Use

Model Support Status

Models in Use

Area AGC Models

DS Time Schedules

Generator Exciters

Generator Governors

Generator Machine Models

Generator Other Models

Generator Stabilizer

Injection Group Models

Line Relay Models

Line Shunts Models

Load Characteristics

Load Component

Load Distributed Generation

Load Distribution Equivalent

Load Model Group

Load Relays

Measurement Objects Model

PlayIn Configuration

Switched Shunt Models

TS Limit Logic

User-Defined

Open New Explorer

Generator Machine Models

Model Summary

Buses

Generators

Filter: Advanced

Machine Model: VWSCC

Find... Remove Quick Filter

Show Block Diagram

Machine Model	Number of Bus	ID	Name_Nominal kV of Bus	Area Name of Gen	Type	MVA Base	Device Status	Criteria	Sub-Int Used	Diff Modif
InfiniteBusSignal										
MOTOR1 (79)										
PLAYINGEN										
PV1G	1	12020	1	CLAPHAM_115.0	NEW MEXICO	VWSCC	100	Active		
PVD1	2	67562	1	CRANRFLT_12.50	PACE	VWSCC	10	Active		
REGC_A	3	67562	2	CRANRFLT_12.50	PACE	VWSCC	10	Active		
REGC_B	4	67562	3	CRANRFLT_12.50	PACE	VWSCC	10	Active		
REGC_C										
STCON (2)										
SVCWSC (16)										
VWSCC (4)										
WT1G										
WT1G1										
WT2G										
WT2G1										
WT3G										
WT3G1										
WT3G2										
WT4G										
WT4G1										

Show Models Supported By

☒ PW Only ☒ PTI

☐ BPA ☒ GE

☐ Only Show Used Models

Save Load

Search Search Now Options

Classes of models

List of specific model names for the particular model type

Names will appear in black if the model is in the case

Add a model by right-clicking

Model support status

Navigating a List of Models



- Choose “All” to get a list of all Stabilizers
- Choose specific type to get a list of all the parameters
- **Bold** values represent non-default values

The screenshot shows the PowerWorld software interface. On the left, the 'Stabilizer' list has 'All (1047)' selected. Below it, the 'Model' list has 'GENROU (882)' selected. The main table displays parameters for the selected model. The table has columns for 'Fully Supported', 'Number of Bus', 'ID', 'Name_Nominal kV of Bus', 'Name of Bus', 'Type', 'MVA Base', 'Device Status', and various parameters (H, D, Ra, Xd, Xq, Xdp, Xqp, Xdpp, Xl, Tdop, Tqop, Tdopp, Tqopp, S(1.0), S(1.2)).

Fully Supported	Number of Bus	ID	Name_Nominal kV of Bus	Name of Bus	Type	MVA Base	Device Status	H	D	Ra	Xd	Xq	Xdp	Xqp	Xdpp	Xl	Tdop	Tqop	Tdopp	Tqopp	S(1.0)	S(1.2)	
1	YES	10246	1	PERSONG1_18.00	PERSONG1	PSS2A	170	Active	4.2	0	0	1.65	1.55	0.2	0.6	0.19	0.15	8.5	0.5	0.02	0.12	0.076	0.317
2	YES	10261	1	REEVE_G1_13.80	REEVE_G1	PSS2A	58.822	Active	4.22	0	0	1.73	1.6	0.285	0.8	0.2036	0.1	7.1	2	0.03	0.2	0.194	0.4597
3	YES	10262	1	REEVE_G2_13.80	REEVE_G2	PSS2A	58.822	Active	4.22	0	0	1.73	1.6	0.285	0.8	0.2036	0.1	7.1	2	0.03	0.2	0.194	0.4597
4	YES	10263	1	REEVE_G3_13.80	REEVE_G3	PSS2A	88.235	Active	3.48	0	0	1.76	1.52	0.24	0.7	0.2036	0.1	7	2	0.03	0.1	0.2196	0.6399
5	YES	10318	1	SJUAN_G1_22.00	SJUAN_G1	WSCCST	410	Active	4.87	0	0	2.25	1.825	0.275	0.85	0.2264	0.15	9	0.9	0.036	0.07	0.09	0.2687
6	YES	10319	1	SJUAN_G2_24.00	SJUAN_G2	IEEEEST	410	Active	4.87	0	0	2.25	1.825	0.275	0.85	0.2264	0.15	9	0.9	0.036	0.07	0.09	0.2687
7	YES	10320	1	SJUAN_G3_22.00	SJUAN_G3	WSCCST	616.7	Active	2.91	0	0	2.27	1.7	0.33	0.85	0.27	0.231	7.5	0.9	0.036	0.07	0.065	0.5795
8	YES	10321	1	SJUAN_G4_22.00	SJUAN_G4	WSCCST	616.7	Active	7.4	0	0.0017	1.865	1.6	0.215	0.8	0.205	0.11	8	0.5	0.023	0.05	0.0992	0.348
9	YES	10394	1	LEF_G1_18.00	LEF_G1	PSS2A	234	Active	4.5	0	0.0038	1.744	1.6	0.256	0.4	0.17	0.1	7	0.75	0.03	0.05	0.05	0.3
10	YES	10395	1	LEF_G2_18.00	LEF_G2	PSS2A	234	Active	5.78	0	0.0025	1.715	1.615	0.22	0.4007	0.18	0.1216	8.5	0.539	0.055	0.083	0.0745	0.3077

Parameters

Load Characteristic Models



- Load models apply to either a load, bus, owner, area, or the entire case

Transient Stability Data - Load Characteristic

Filter: Advanced Load Characteristic: General Find... Remove Quick Filter...

Load Characteristic

- All (478)
- CIM5
- CIM6
- CIMW
- CLOD
- CMPLDW
- CMPLDWNF (23)
- DLIGHT
- EXTL
- IEEL
- LD1PAC
- LDFR
- LDRANDOM
- MOTORW (4)
- WSCC (451)
- Load-Specific
- Model Group-Specific
- Bus-Specific (430)
- Owner-Specific
- Zone-Specific
- Area-Specific (21)
- System-Specific

Show Models Supported By

☒ PW Only ☒ PTI

☐ BPA ☒ GE

Save Load

	Fully Supported	Element Type	Number	Name_Nominal kV	ID	Name	MW
1	YES	Bus	13402	BLACKWTR_345.00		BLACKWTR	-50
2	YES	Bus	24007	ALMITOSW_66.00		ALMITOSW	90.45
3	YES	Bus	24017	BLYTHESC_161.00		BLYTHESC	30.94
4	YES	Bus	24024	CHINO_66.00		CHINO	408.99
5	YES	Bus	24028	DELAHO_66.00		DELAHO	252.58
6	YES	Bus	24039	EL NIDO_66.00		EL NIDO	214.02
7	YES	Bus	24055	ETIWANDA_66.00		ETIWANDA	367.48
8	YES	Bus	24057	GOLETA_66.00		GOLETA	149.55
9	YES	Bus	24064	HINSON_66.00		HINSON	243.51
10	YES	Bus	24073	LA FRESA_66.00		LA FRESA	355.68
11	YES	Bus	24075	LAGUBELL_66.00		LAGUBELL	291.93
12	YES	Bus	24083	LITEHIPE_66.00		LITEHIPE	237.4
13	YES	Bus	24098	MOORPARK_66.00		MOORPARK	377.03
14	YES	Bus	24111	PADUA_66.00		PADUA	325.65
15	YES	Bus	24127	S.CLARA_66.00		S.CLARA	273.66
16	YES	Bus	24133	SANTIAGO_66.00		SANTIAGO	310.42
17	YES	Bus	24135	SAUGUS_66.00		SAUGUS	444.39
18	YES	Bus	24152	VESTAL_66.00		VESTAL	75.77
19	YES	Bus	24157	WALNUT_66.00		WALNUT	320.89
20	YES	Bus	24160	VALLEYSC_115.00		VALLEYSC	366.08
21	YES	Bus	24197	ELLIS_66.00		ELLIS	369.54
22	YES	Bus	24199	CHEVMAIN_66.00		CHEVMAIN	172.38
23	YES	Bus	24201	BARRE_66.00		BARRE	344.17
24	YES	Bus	24202	CAMINO_66.00		CAMINO	2.04
25	YES	Bus	24203	CENTER_66.00		CENTER	239.72
26	YES	Bus	24204	EAGLEMTN_66.00		EAGLEMTN	1.05
27	YES	Bus	24205	EAGLOCK_66.00		EAGLOCK	115.85

Search Search Now Options

Precedence:

- 1.Load-specific
- 2.Load Model Group-specific
- 3.Bus-specific
- 4.Owner-specific
- 5.Zone-specific
- 6.Area-specific
- 7.System-specific
- 8.Load Component-specific
- 9.Default load modeling option with transient stability options

Load Characteristic Models



- Models like CMPLDW have up to 130 parameters
- Hundreds or thousands of loads with the same CMPLDW parameters
- Group together models with the same parameters
- Create new objects in Simulator
 - Load Model Groups
 - Load Distribution Equivalent Types

Load Characteristic Models



Model Explorer: Load Model Use

Explore

- Recent
- Network
- Aggregations
- Solution Details
- Case Information and Auxiliary
- Contingency Analysis
- Fault Analysis
- Optimal Power Flow
- Transient Stability
 - DC Models
 - Summary
 - Generator Model Use (36/1)
 - Load Model Use (3645)**
 - Model Support Status (322)
 - Models in Use (96)
- Generator Exciters (2825)
- Generator Governors (2267)
- Generator Machine Models (3381)
- Generator Other Models (611)
- Generator Stabilizer (1493)
- Line Relay Models (147)
- Load Characteristics (80)
- Load Distribution Equivalent Type (386)
- Load Model Group (58)
- Load Relay (2551)

Open New Explorer

Load Model Summary

	Number of Bus	Name of Bus	ID	Status	MW	Mvar	Load Model Group	Distribution Equivalent Type
1	10005	ALCAZAR	1	Closed	18.13	-0.81	HID4	RES 43
2	10008	ALLISON	1	Closed	9.64	3.17	HID	COM31
3	10013	ANDERSON	1	Closed	8.98	-0.97	HID4	RES 11
4	10015	ARNO_1	1	Closed	3.61	0.04		
5	10017	ARRIBA	1	Closed	3.74	-0.32		
6	10020	ASPEN	1	Closed	19.25	3.91	HID4	RES 55
7	10022	AVILA	1	Closed	8.48	2.43	HID4	RES 90
8	10027	BACA	1	Closed	3.86	-0.64		
9	10029	BALL_PRK	1	Closed	1.72	-0.20		
10	10032	BECKNER	1	Closed	13.11	1.78	HID	COM22
11	10034	BEL_AIR	1	Closed	12.90	-0.23	HID4	RES 43
12	10036	ARNO_2	1	Closed	9.21	-0.77	HID4	RES 11
13	10037	FIRST_ST	1	Closed	12.75	4.63	HID4	RES 62
14	10040	BEV_WOOD	1	Closed	7.15	1.26	HID4	RES 35
15	10041	BISTI	1	Closed	7.50	4.28	HID3	RAG47
16	10043	BLCKRA	1	Closed	18.50	4.32	HID4	RES 35
17	10046	BOSQUE_F	1	Closed	4.81	-0.06		
18	10049	BROADWAY	1	Open	0.00	0.00		
19	10050	BUCKMAN	1	Closed	7.54	-1.78	HID	COM32
20	10053	BURNHAM	1	Closed	1.50	0.50		

Fields

Find Field... Add ->

Available Fields

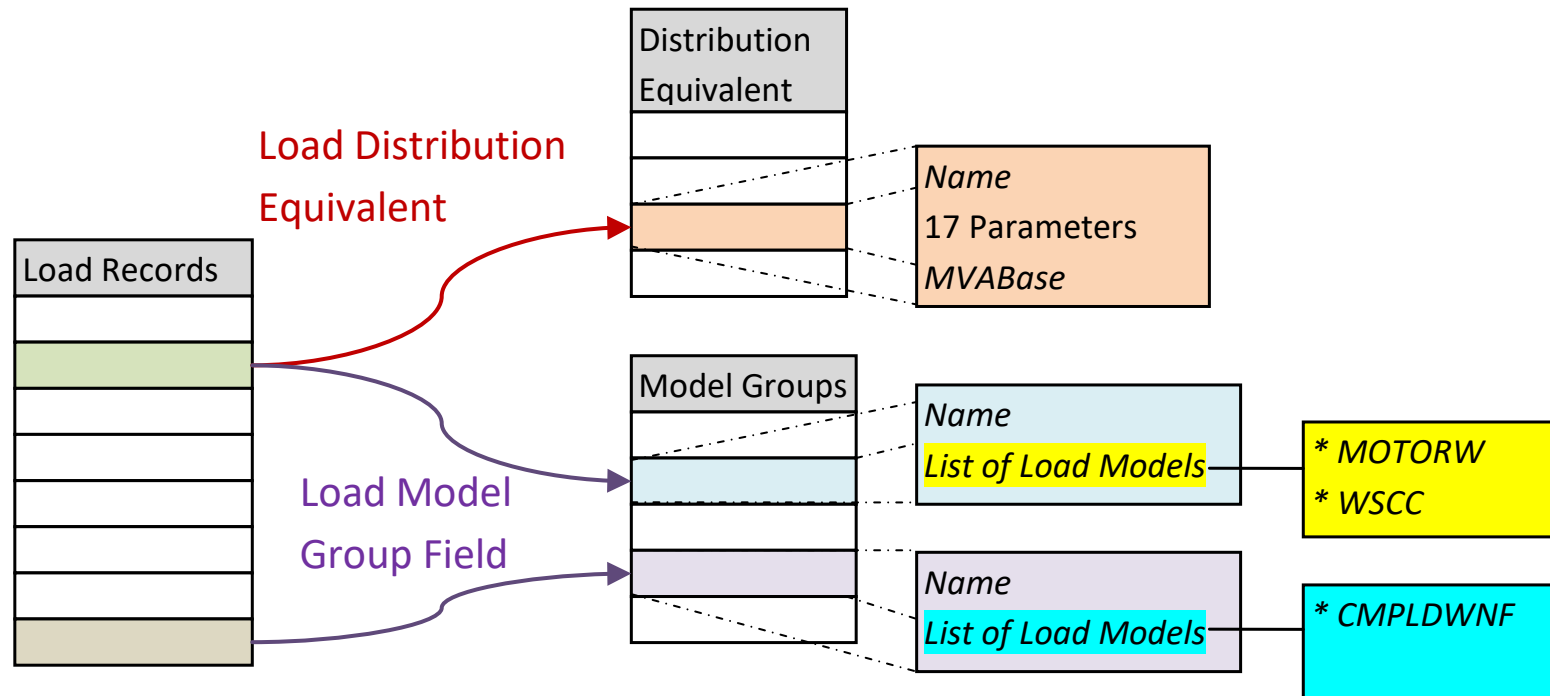
- Sensitivity of Bus
- Substation
- Super Area
- Time Step
- Transient Stability
 - Results
 - Save
 - Load Characteristic Name (Motor)
 - Load Characteristic Name (Static)
 - Load Distribution Equivalent Type**
 - Load Model Group
 - Load Relay Name
- Voltage
- Zone
- Key Fields
- Required Fields
- Secondary Key Fields

Expand Collapse

Frozen Columns 1

Reset to Factory Defaults

Load Characteristic Models



Load Model Group



- Load Model Group:
 - Identified by unique name
 - List of Load Characteristic Models assigned to it
 - MOTORW, WSCC, CMPLDWNF, etc.
 - Allows flexibility in grouping load characteristic models with the same parameters that area, zone, etc. aggregations do not
 - May represent the behavior of a climate group
 - “High Desert”

Load Characteristic Models



- Load Model Hierarchy:
 1. Load-specific
 2. Load Model Group-specific
 3. Bus-specific
 4. Owner-specific
 5. Zone-specific
 6. Area-specific
 7. System-specific
 8. Load Component-specific
 9. Default load modeling option with transient stability options

Load Characteristic Models



Load Model
Hierarchy

The screenshot displays the 'Model Explorer: Load Characteristics' window. The left pane shows a tree view of the model hierarchy. The middle pane lists various load characteristics, with 'MOTORW (5097)' selected. The right pane shows a table of load data.

Element Type	Number	Name_Nominal kV	ID	Area Name of Load	MW	Mvar	Type
Load	10005	ALCAZAR_12.50	1	NEW MEXICO	17.446	-1.667	MOTORW
Load	10008	ALLISON_13.80	1	NEW MEXICO	6.163	0	MOTORW
Load	10013	ANDERSON_12.50	1	NEW MEXICO	8.599	1.65	MOTORW
Load	10020	ASPEN_12.50	1	NEW MEXICO	20.083	-1.355	MOTORW
Load	10022	AVILA_12.50	1	NEW MEXICO	8.304	1.518	MOTORW
Load	10032	BECKNER_12.50	1	NEW MEXICO	13.457	0.536	MOTORW
Load	10034	BEL_AIR_12.50	1	NEW MEXICO	13.001	-0.237	MOTORW
Load	10036	ARNO_2_12.50	1	NEW MEXICO	8.834	0.99	MOTORW
Load	10037	FIRST_ST_12.50	1	NEW MEXICO	11.957	3.476	MOTORW
Load	10040	BEV_WOOD_12.50	1	NEW MEXICO	7.031	2.022	MOTORW
Load	10041	BISTI_230.0	1	NEW MEXICO	7.5	4.285	MOTORW
Load	10043	BLCKRA_12.50	1	NEW MEXICO	28.676	1.377	MOTORW
Load	10046	BOSQUE_F_12.50	1	NEW MEXICO	5.342	1.597	MOTORW
Load	10050	BUCKMAN_12.50	1	NEW MEXICO	8.049	-4.495	MOTORW
Load	10061	CENTRALP_12.50	1	NEW MEXICO	14.284	4.548	MOTORW
Load	10067	CLAREMNT_12.50	1	NEW MEXICO	17.577	-1.468	MOTORW
Load	10070	COAL_12.50	1	NEW MEXICO	15.361	2.37	MOTORW
Load	10072	WINDWROCK_115.0	1	NEW MEXICO	32.97	3.375	MOTORW
Load	10081	CORNELL_12.50	1	NEW MEXICO	10.798	0.381	MOTORW
Load	10084	COTTONWD_12.50	1	NEW MEXICO	36.015	4.21	MOTORW
Load	10090	DEMING_W_13.80	1	NEW MEXICO	5.314	1.827	MOTORW
Load	10093	EASTRDGE_12.50	1	NEW MEXICO	16.072	-0.357	MOTORW
Load	10097	EL_CERRO_12.50	1	NEW MEXICO	10.201	3.239	MOTORW
Load	10104	EMBUDO_12.50	1	NEW MEXICO	14.066	0.431	MOTORW
Load	10106	FOURHILL_12.50	1	NEW MEXICO	16.981	5.073	MOTORW
Load	10108	FT_MARCY_12.50	1	NEW MEXICO	15.761	0.465	MOTORW

Load Distribution Equivalent



- Supplementary model that defines an equivalent of the distribution system's transformer, capacitors, and feeder
- Created independently of the load characteristic models
- Can be used with any load characteristic model
- Design assumes small number of Load Distribution Equivalent Types with many different loads assigned to each

Load Distribution Equivalent



- First 17 parameters of the CMPLDW load characteristic model along with MVA base

Model Explorer: Load Distribution Equivalent Type

Explore F...

Load Distribution Equivalent Type

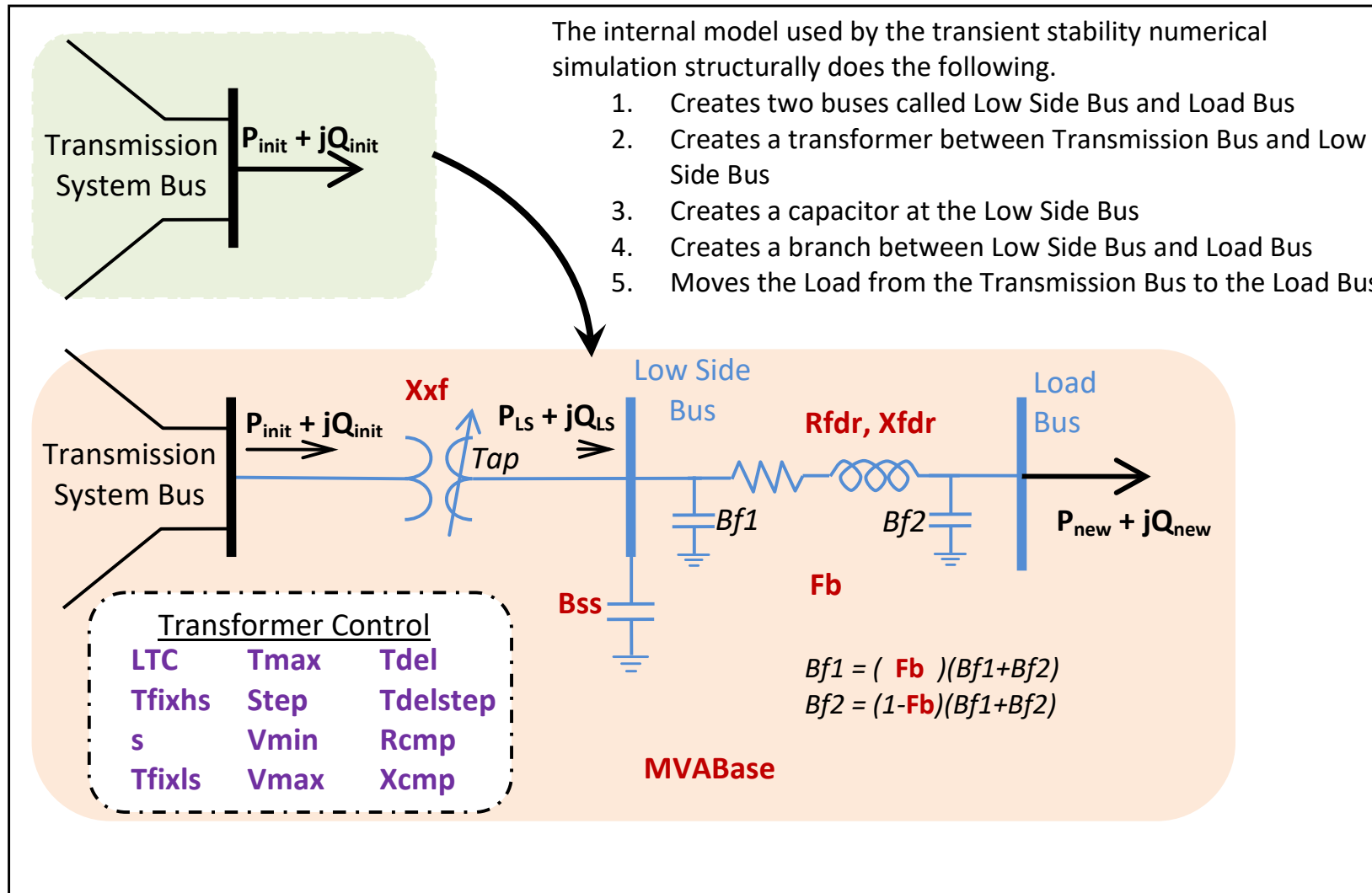
Records Set Columns Options

Filter Find... Remove Quick Filter

	Name	LongNa	Device Status	Number	XFMinKV	Mbase	Bss	Rfdr	Xfdr	Fb	Xxf	Tfixhs	
1	AGR_IRR	Agri	Active	0	0	-1	0	0	0.01	1	0.08	1	
2	AGR_IRR2	AGR_IRI	Active	0	0	-1	0	0	0.01	1	0.08	1	
3	AGR_IRR_noXF	AGR_IRI	Active	0	0	-1	0	0	0.01	1	0	1	
4	AGR_PMP	Agri	Active	0	0	-1	0	0	0.01	1	0.08	1	
5	AGR_PMP2	AGR_PN	Active	0	0	-1	0	0	0.01	1	0.08	1	
6	AGR_PMP_noXF	AGR_PN	Active	0	0	-1	0	0	0.01	1	0	1	
7	DSW_COM	Desert S	Active	0	0	-1.25	0	0.04	0.04	0.75	0.08	1	
8	DSW_COM2	Desert S	Active	0	0	-1.25	0	0.04	0.04	0.75	0.08	1	
9	DSW_COM_noXF	Desert S	Active	0	0	-1.25	0	0.04	0.04	0.75	0	1	
10	DSW_MIX	Desert S	Active	0	0	-1.25	0	0.04	0.04	0.75	0.08	1	
11	DSW_MIX2	Desert S	Active	0	0	-1	0	0	0.01	1	0.08	1	
12	DSW_MIX22	Desert S	Active	0	0	-1.25	0	0.04	0.04	0.75	0.08	1	

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Load Distribution Equivalent



Load Distribution Equivalent



- MVABase determines the *DistEquivMVABase*
 - (MVABase > 0) then *DistEquivMVABase* = MVABase
 - (MVABase < 0) then *DistEquivMVABase* = Pinit/MVABase
 - (MVABase = 0) then *DistEquivMVABase* = Pinit/0.8
- Impedance parameters are on the *DistEquivMVABase* and are converted to system base
- Transformer taps and impedances are converted to the system MVA base on the fixed taps
- Transformer tap ratio set so that Low Side Bus voltage is equal to the average of Vmin and Vmax
- After converting the impedances and taps, Low Side Bus voltage and flow on the Low Side Bus ($P_{LS} + jQ_{LS}$) are calculated exactly
- Iterative process to determine $P_{new} + jQ_{new}$, Bf1, and Bf2 depending on the transient load model

Load Distribution Equivalent



- If Load Bus voltage falls below 0.95 per unit, feeder impedances R_{fdr} and X_{fdr} are reduced so that the Load Bus voltage is 0.95 per unit
 - There is no need to modify the input data to prevent the Load Bus voltage from being too small

New Model CMPLDWNF



- Identical to CMPLDW except that parameters for Load Distribution Equivalent have been removed (first 17 parameters and MVABase)

The screenshot shows the 'Load Characteristic Information' dialog box for the 'DSW_MIX' model group. The 'Load Characteristics' tab is active, showing a list of parameters for the 'Active - CMPLDWNF' model. The parameters are organized in a grid with up/down arrows for adjustment. A 'Show Torque Speed Dialog' button is at the bottom, and 'OK', 'Save', and 'Cancel' buttons are at the bottom right.

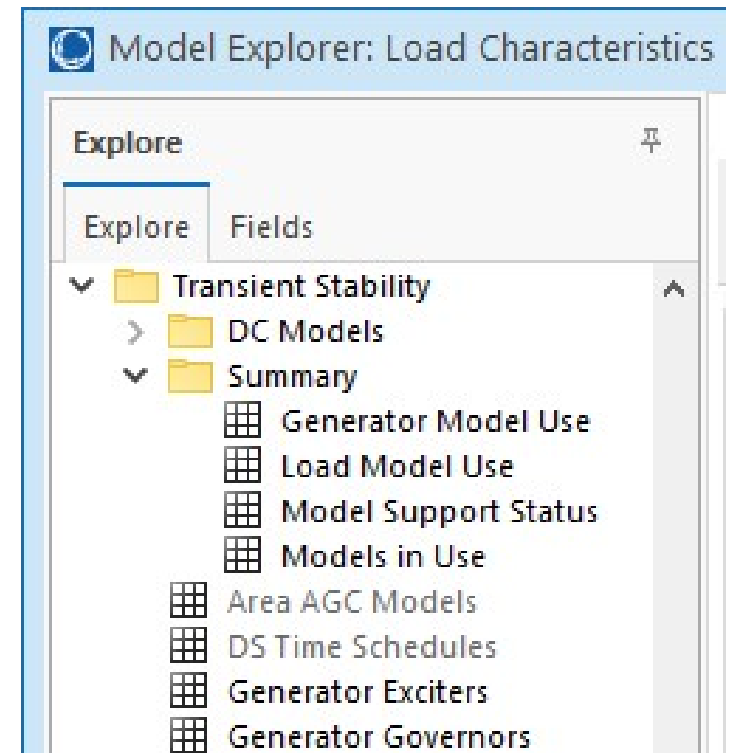
Parameters			
FmA	0.24800	P2e	1.00000
FmB	0.15900	P2c	0.70000
FmC	0.06500	Pfrq	0.00000
FmD	0.22900	Q1e	2.00000
Fel	0.10900	Q1c	-0.50000
PFel	1.00000	Q2e	1.00000
Vd1	0.70000	Q2c	1.50000
Vd2	0.50000	Qfrq	-1.00000
frcl	1.00000	Mtypa	3.00000
PFs	-0.99500	Mtypb	3.00000
P1e	2.00000	Mtypc	3.00000
P1c	0.30000	Mtypd	1.00000
LFma	0.75000	Rsa_CompPFa	0.04000
Vrc1a_Vtr2a		Lsa_Vstalla	1.80000
Trc1a_Ttr2a		Lpa_Rstalla	0.12000
Vtr2a_Vc1offa		Lppa_Xstalla	0.10400
Ttr2a_Vc2offa		Tpoa_Tstalla	0.09500
Ftr2a_Vc1ona		Tppoa_Frsta	0.00210
Vrc2a_Vc2ona		Ha_Vrsta	0.10000
Trc2a_Ttha		Etrqa_Trsta	0.00000
Th1ta		Vtr1a_Fuvra	0.70000
Th2ta		Ttr1a_Vtr1a	0.02000
Tva		Ftr1a_TTr1a	0.20000
LFmb		Rsb_CompPFb	

Model Explorer:

Transient Stability\Summary\



- On the Model Explorer, under Transient Stability\Summary, there are the following entries:
 - Generator Model Use
 - Lists each generator along with the dynamic models it is using
 - Load Model Use
 - Lists each load along with the dynamic models it is using
 - Model Support Status
 - A list of all the models that Simulator can read/write
 - Listing of models that can be read from or written to the appropriate text based file format for other software packages
 - Models in Use
 - A list of all the models used in this case, along with a count of each



Generator Model Use Example



- For the example case, open the Summary folder
- On the Model Explorer, open the Transient Stability\Summary page
- Open the Generator Model Use page

If multiple models exist, they are listed separated by commas

	Number of Bus	Name of Bus	ID	Status	Gen MW	MVA Base	Machine	Exciter	Governor	Stabilizer
1	10246	PERSONG1	1	Open	0.00	170.00	GENROU	EXST4B	GGOV1	PSS2A
2	10261	REEVE_G1	1	Closed	22.00	58.82	GENROU	TEXS	GGOV1	PSS2A
3	10262	REEVE_G2	1	Open	0.00	58.82	GENROU	TEXS	GGOV1	PSS2A
4	10263	REEVE_G3	1	Closed	25.00	88.24	GENROU	TEXS	GGOV1	PSS2A
5	10318	SJUAN_G1	1	Closed	360.00	410.00	GENROU	EXAC3A		IEEEST
6	10319	SJUAN_G2	1	Closed	350.00	410.00	GENROU	RI		PSS2A
7	10320	SJUAN_G3	1	Closed	544.00	616.70	GENTPF	EXAC3A, (ESAC2A)	IEEEG1	WSCCST
8	10321	SJUAN_G4	1	Closed	444.68	616.70	GENTPF	EXAC3A	IEEEG1	WSCCST
9	10394	LEF_G1	1	Closed	142.50	234.00	GENROU	EXST4B	GGOV1	PSS2A
10	10395	LEF_G2	1	Closed	142.50	234.00	GENROU	EXST4B	GGOV1	PSS2A
11	10396	LEF_S1	1	Closed	285.00	373.00	GENROU	EXST4B		PSS2A
12	10415	LVGT	1	Open	0.00	29.60			GGOV1	
13	10485	AFTONS	1	Closed	94.00	142.68				PSS2B
14	10486	AFTONG	1	Closed	140.80	142.68			GGOV1	PSS2B
15	10491	LRDSBGG1	1	Closed	20.00	60.00				
16	10492	LRDSBRG2	1	Closed	20.00	60.00				
17	10903	VEF	1	Open	0.00	61.00	GENROU	EXST4B		

Use Toggle to change active status of models
Inactive models are shown in parentheses

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Model Support Status Example



- Open the Model Support Status page

Model support statuses for all models

Class	Name	PowerWorld	GE PSLF	PTI PSS/E	BPA IPF
1 Machine Model	CIMTR1	YES	YES	YES	NO
2 Machine Model	CIMTR2	YES	YES	YES	NO
3 Machine Model	CIMTR3	YES	YES	YES	NO
4 Machine Model	CIMTR4	YES	YES	YES	NO
5 Machine Model	GENCC	YES	YES	Translate (GENTP1)	NO
6 Machine Model	GENCLS	YES	YES	YES	YES
7 Machine Model	GENCLS_PLAYBACK	YES	YES (GENCLS)	YES	NO
8 Machine Model	GENPWFluxDecay	YES	YES	YES	NO
9 Machine Model	GENPWTwoAxis	YES	YES	YES	NO
10 Machine Model	GENDCO	YES	YES	YES	NO
11 Machine Model	GENSAE	YES	Translate (GEN: YES)	YES	YES
12 Machine Model	GENSAL	YES	Translate (GEN: YES)	YES	YES
13 Machine Model	GENROE	YES	Translate (GEN: YES)	YES	YES
14 Machine Model	GENROU	YES	Translate (GEN: YES)	YES	YES
15 Machine Model	GENTPF	YES	YES	Translate (GENTP1)	NO
16 Machine Model	GENTPJ	YES	YES	Translate (GENTP1)	NO
17 Machine Model	GENQEC	YES	YES	YES	NO
18 Machine Model	GENTRA	YES	Translate (GEN: YES)	YES	YES
19 Machine Model	MOTOR1	YES	YES	YES	NO
20 Machine Model	STCON	YES	YES	YES	NO
21 Machine Model	CSTATT	YES	YES	YES	NO
22 Machine Model	GEWTG	YES	YES	YES	NO
23 Machine Model	GENWRI	YES	YES	YES	NO
24 Machine Model	WT1G	YES	YES	Translate (WT1G1)	NO
25 Machine Model	GENIND	YES	YES	YES	NO
26 Machine Model	WT1G1	YES	Translate (WT1)	YES	NO
27 Machine Model	WT2G1	YES	YES	YES	NO
28 Machine Model	WT2G	YES	YES	YES	NO
29 Machine Model	WT3G	YES	YES	Translate (WT3G2)	NO
30 Machine Model	WT3G1	YES	YES	YES	NO
31 Machine Model	WT3G2	YES	Translate (WT3)	YES	NO
32 Machine Model	WT4G1	YES	Translate (WT4)	YES	NO
33 Machine Model	WT4G	YES	YES	Translate (WT4G1)	NO
34 Machine Model	REGC_A	YES	YES	YES (REGCA1)	NO
35 Machine Model	REGC_B	YES	YES	YES	NO
36 Machine Model	DER_A	YES	YES	YES	NO
37 Machine Model	REGC_C	YES	YES	YES	NO
38 Machine Model	PVD1	YES	YES	YES	NO
39 Machine Model	PV1G	YES	YES	Translate (WT4G1)	NO
40 Machine Model	CBEST	YES	YES	YES	NO

Listed models can be read from or written to the appropriate text based file format for other software packages

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Models in Use Example



- Open the Models in Use page

The screenshot shows the 'Model Explorer: Models in Use' window. The left pane displays a tree view of the model hierarchy, with 'Models in Use' selected under the 'Summary' folder. The right pane shows a table with the following columns: Model Class, Object Type, Active and Online Count, Active Count, Inactive Count, and Fully Supported. The table lists 38 models, including 'All Models', 'Machine Model', 'Exciter', and 'Load Model'.

	Model Class	Object Type	Active and Online Count	Active Count	Inactive Count	Fully Supported
1	All Models	All Models	15949	17793	1	YES
2	Machine Model	GENSAL	835	1060	0	YES
3	Machine Model	GENROU	874	1095	0	YES
4	Machine Model	GENTPF	682	822	0	YES
5	Machine Model	GENTPJ	4	4	0	YES
6	Machine Model	GENCC	48	60	0	YES
7	Machine Model	MOTOR1	37	79	0	YES
8	Machine Model	STCON	2	2	0	YES
9	Machine Model	GEWTG	17	34	0	YES
10	Machine Model	GENWRI	3	19	0	YES
11	Machine Model	SVCWSC	10	16	0	YES
12	Machine Model	VWSCC	3	4	0	YES
13	Over Excitation Lim	OEL1	367	418	0	YES
14	Pref Controller	LCFB1	53	56	0	YES
15	Relay Model	GP1	7	7	0	YES
16	Exciter	SEXS_GE	0	1	0	YES
17	Exciter	SCRX	7	11	0	YES
18	Exciter	IEEET1	48	51	0	YES
19	Exciter	EXAC1	136	156	0	YES
20	Exciter	EXAC1A	4	5	0	YES
21	Exciter	EXAC2	44	49	0	YES
22	Exciter	EXAC3A	4	4	0	YES
23	Exciter	EXAC4	9	15	0	YES
24	Exciter	EXAC6A	3	3	0	YES
25	Exciter	EXAC8B	140	158	0	YES
26	Exciter	EXWTG1	3	19	0	YES
27	Exciter	EXWTGE	17	34	0	YES
28	Exciter	EXST1_GE	680	864	0	YES
29	Exciter	EXST2	11	13	0	YES
30	Exciter	EXST2A	43	49	0	YES
31	Exciter	EXST3	5	22	0	YES
32	Exciter	EXST3A	28	31	0	YES
33	Exciter	EXST4B	307	356	0	YES
34	Exciter	ESST1A	16	22	0	YES
35	Exciter	ESST2A	1	2	0	YES
36	Exciter	ESST4B	10	16	0	YES
37	Exciter	ST6B	2	2	0	YES
38	Exciter	EXDC1	249	311	0	YES

A summary of the models defined in this case

Includes whether the model is active or inactive, and whether its associated object is online

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Transient Stability Model Explorer: Model Classes



- Clicking on a particular model class opens a new pane in the right portion of the Model Explorer showing the available model types for that class
- Gray text indicates a model class or type not presently used by any device
- This pane has the following attributes
 - “All” shows all present models of the model class
 - Number in parenthesis indicates the number of models of that type which are present
 - Green icons indicate that a model is fully supported by Simulator
 - Red icons indicate that a model can be read/written but is not currently supported by the transient stability numerical integration
 - “Show Models Supported By” and a set of four check boxes- *PW Only*, *PTI*, *BPA*, and *GE* to filter the displayed list
 - At the bottom are buttons to save or load dynamic data from an external file

Model Classes- Filter the Shown Formats



- Types can be further filtered to show only those models supported by other formats

Stabilizer

☒	All (1306)
☒	BPA_SF
☒	BPA_SG
☒	BPA_SH
☒	BPA_SHPLUS
☒	BPA_SI
☒	BPA_SP
☒	BPA_SS

Show Models Supported By

☐ PW Only	☐ PTI
☒ BPA	☐ GE
☐ Only Show Used Models	

Save Load

Stabilizer

☒	All (1306)
☒	IEE2ST
☒	IEEEEST (178)
☒	IVOST
☒	PSS2A (838)
☒	PSS2B (37)
☒	PSS3B
☒	PSS4B
☒	PSS4C
☒	PTIST1
☒	PTIST3
☒	ST2CUT
☒	STAB1
☒	STAB2A
☒	STAB3
☒	STAB4
☒	STBSVC
☒	WT12A1
☒	WT3P1
☒	WTPA1

Show Models Supported By

☐ PW Only	☒ PTI
☐ BPA	☐ GE
☐ Only Show Used Models	

Save Load

Stabilizer

☒	All (1306)
☒	IEEEEST (178)
☒	PFQRG (4)
☒	PSS1A
☒	PSS2A (838)
☒	PSS2B (37)
☒	PSS3B
☒	PSSSB (83)
☒	PSSSH
☒	STAB1
☒	WSCCST (166)
☒	WT1P
☒	WT1P_B
☒	WT2P
☒	WT3P
☒	WTGPT_A

Show Models Supported By

☐ PW Only	☐ PTI
☐ BPA	☒ GE
☐ Only Show Used Models	

Save Load

Model Type Example



- When you choose a particular model type from a model class, additional columns will appear which show all the input parameters for that model type

GENROU Model Parameters

Specific Machine Model types

Number Bus	ID	Name_Nominal of Bus	kV	Area Name of Gen	Type	MVA Base	Device Status	Model Class	H	D	Ra	Xd	Xq	Xdp	Xqp	Xdpp	Xi	Tdop	Tqop	Tdopp
1	10246	1	PERSONG1_18.00	NEW MEXICO	GENROU	170	Active	Machine Model	4.2	0	0	1.65	1.55	0.2	0.6	0.19	0.15	8.5	0.6	0.02
2	10261	1	REEVE_G1_13.80	NEW MEXICO	GENROU	58.822	Active	Machine Model	4.22	0	0	1.73	1.6	0.285	0.8	0.2036	0.1	7.1	2	0.03
3	10262	1	REEVE_G2_13.80	NEW MEXICO	GENROU	58.822	Active	Machine Model	4.22	0	0	1.73	1.6	0.285	0.8	0.2036	0.1	7.1	2	0.03
4	10263	1	REEVE_G3_13.80	NEW MEXICO	GENROU	88.235	Active	Machine Model	3.48	0	0	1.76	1.52	0.24	0.7	0.2036	0.1	7	2	0.03
5	10318	1	SJUAN_G1_22.00	NEW MEXICO	GENROU	410	Active	Machine Model	3.71	0	0.004	1.7	1.4	0.24	0.33	0.21	0.17	5.5	0.51	0.05
6	10319	1	SJUAN_G2_24.00	NEW MEXICO	GENROU	410	Active	Machine Model	3.8	0	0.002	1.85	1.4	0.3088	0.33	0.2573	0.17	6.76	0.51	0.05
7	10394	1	LEF_G1_18.00	NEW MEXICO	GENROU	234	Active	Machine Model	4.87	0	0	2.25	1.825	0.275	0.85	0.2264	0.15	9	0.9	0.036
8	10395	1	LEF_G2_18.00	NEW MEXICO	GENROU	234	Active	Machine Model	4.87	0	0	2.25	1.825	0.275	0.85	0.2264	0.15	9	0.9	0.036
9	10396	1	LEF_S1_18.00	NEW MEXICO	GENROU	373	Active	Machine Model	2.91	0	0	2.27	1.7	0.33	0.85	0.27	0.231	7.5	0.9	0.036
10	10415	1	LVGT_13.80	NEW MEXICO	GENROU	29.6	Active	Machine Model	7.4	0	0.0017	1.865	1.6	0.215	0.8	0.205	0.11	8	0.5	0.023
11	10485	1	AFTONS_13.80	NEW MEXICO	GENROU	143.6	Active	Machine Model	4.35	0	0.0028	1.445	1.382	0.22	0.375	0.185	0.11	5.97	0.52	0.039
12	10486	1	AFTONG_18.00	NEW MEXICO	GENROU	189	Active	Machine Model	4.8	0	0.0025	1.77	1.662	0.235	0.4	0.195	0.12	7	0.539	0.055
13	10491	1	LRDSBG1_13.80	NEW MEXICO	GENROU	60	Active	Machine Model	2.18	0	0.003	2.3	2.25	0.28	1.1	0.226	0.12	6.5	3	0.03
14	10492	1	LRDSBRG2_13.80	NEW MEXICO	GENROU	60	Active	Machine Model	2.18	0	0.003	2.3	2.25	0.28	1.1	0.226	0.12	6.5	3	0.03
15	10903	1	VEF_18.00	NEW MEXICO	GENROU	191	Active	Machine Model	5.7	0	0.003	1.47	1.4	0.212	0.4	0.16	0.12	7.7	0.54	0.039
16	11051	1	COPPER_G_13.80	EL PASO	GENROU	89.5	Active	Machine Model	6.96	0	0	2.04	1.8	0.278	0.7	0.239	0.19	8.2	1	0.05
17	11112	1	NEWMANG1_13.80	EL PASO	GENROU	96	Active	Machine Model	3.79	0	0	1.6	1.48	0.22	0.9	0.173	0.16	6	0.6	0.03
18	11113	1	NEWMANG2_13.80	EL PASO	GENROU	96	Active	Machine Model	3.54	0	0	1.6	1.5	0.226	0.4	0.19	0.15	8	1	0.025
19	11114	1	NEWMANG3_13.80	EL PASO	GENROU	135.3	Active	Machine Model	3.21	0	0	1.56	1.4	0.255	0.5	0.22	0.15	8.5	1	0.03
20	11115	1	NEWMN4G1_13.80	EL PASO	GENROU	94.444	Active	Machine Model	6.6	0	0	1.54	1.45	0.324	0.7	0.26	0.2	8	1	0.05
21	11116	1	NEWMN4G2_13.80	EL PASO	GENROU	94.444	Active	Machine Model	6.6	0	0	1.54	1.45	0.324	0.7	0.26	0.2	8	1	0.05
22	11117	1	NEWMN4S1_13.80	EL PASO	GENROU	133.333	Active	Machine Model	3.58	0	0	1.48	1.2	0.26	0.45	0.18	0.144	10.5	1	0.05
23	11133	1	RIOGD_G6_13.80	EL PASO	GENROU	58.822	Active	Machine Model	4.7	0	0	1.55	1.3	0.256	0.4	0.181	0.15	6.7	1	0.03
24	11134	1	RIOGD_G7_13.80	EL PASO	GENROU	58.824	Active	Machine Model	3	0	0	1.7	1.3	0.25	0.6	0.22	0.19	7	0.4	0.025
25	11135	1	RIOGD_G8_17.50	EL PASO	GENROU	185	Active	Machine Model	4.43	0	0	1.5	1.3	0.16	0.6	0.14	0.1	10	0.7	0.05
26	11208	1	NEWMN5G1_13.80	EL PASO	GENROU	114	Active	Machine Model	6.5	0	0	1.94	1.85	0.21	0.425	0.165	0.12	7.9	0.56	0.04
27	11209	1	NEWMN5G2_13.80	EL PASO	GENROU	114	Active	Machine Model	6.5	0	0	1.94	1.85	0.21	0.425	0.165	0.12	7.9	0.56	0.04
28	11226	1	RIOGD_G9_17.50	EL PASO	GENROU	100	Active	Machine Model	2.9474	0	0.0053	0.937	0.624	0.302	0.624	0.243	0.13	2.96	0.35	0.073
29	11227	1	RIOGDG10_17.50	EL PASO	GENROU	100	Active	Machine Model	2.9474	0	0.0053	0.937	0.624	0.302	0.624	0.243	0.13	2.96	0.35	0.073
30	11228	1	RIOGDG11_17.50	EL PASO	GENROU	100	Active	Machine Model	2.9474	0	0.0053	0.937	0.624	0.302	0.624	0.243	0.13	2.96	0.35	0.073
31	11229	1	CAL1_G1_13.80	EL PASO	GENROU	114	Active	Machine Model	2.9474	0	0.0053	0.937	0.624	0.302	0.624	0.243	0.13	2.96	0.35	0.073

Transient Stability Data: Object Dialogs



- In general, Simulator devices have Information Dialogs, and models can be edited both by using these dialogs and by using the Model Explorer
- On the various dialogs for devices such as Generators, Loads, Switched Shunts, etc., there will be a tab labeled “Stability”
- This tab can be used to define the transient stability models for the device
- Stability tab attributes
 - Insert button
 - Delete button
 - Type of model and whether it is active
 - Show Diagram (displays the model’s block diagram)
 - Parameter list

Example Object Dialog



- Right click on a model in the Model Explorer and select “Show Dialog”
- An example of an exciter’s dialog is shown here

Models can be inserted or deleted here

Model parameters can be modified here for the selected type of model

Hovering the mouse will cause a hint to appear with a description of the parameter

Several model class tabs

Checkbox indicates if the model is active

Generator Information for Present

Bus Number: 10246 Find By Number

Bus Name: PERSONG1 Find By Name

ID: 1 Find ...

Area Name: NEW MEXICO (10)

Labels ... no labels

Generator MVA Base: 170.00

Status: ☒ Open ☐ Closed

Energized: ☒ NO (Offline) ☐ YES (Online)

Fuel Type: UN (Unknown) | [PW=0] [EPC=0]

Unit Type: UN (Unknown) | [PW=0] [EPC=0]

Power and Voltage Control Costs OPF Faults Owners, Area, etc. Custom Stability

Machine Models Exciters Governors Stabilizers Other Models Step-up Transformer Terminal and State

Insert Delete Gen MVA Base: 170.0 Show Block Diagram Create VCurve

Type: Active - EXST4B ☒ Active (only one may be active) Set to Defaults

Parameters

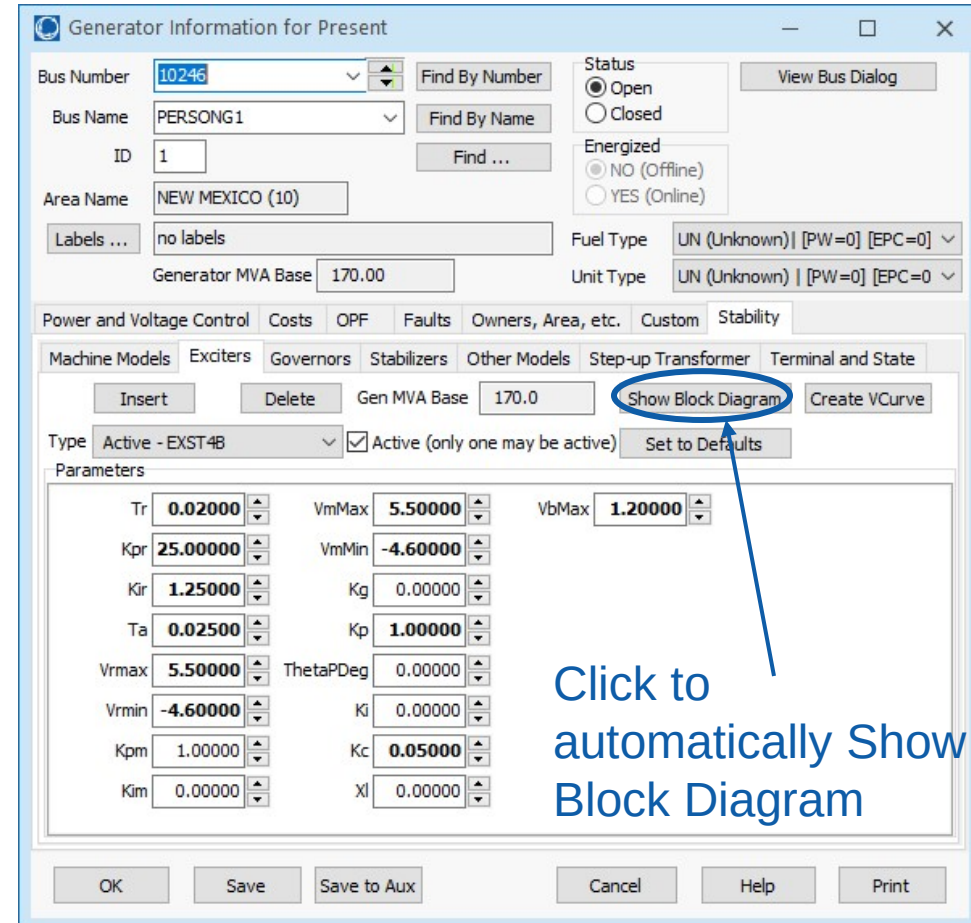
r	0.02000	VmMax	5.50000	VbMax	1.20000
R	25.00000	VmMin	-4.60000		
X	1.25000	Kg	0.00000		
Ta	0.02500	Kp	1.00000		
Vrmax	5.50000	ThetaPDeg	0.00000		
Vrmin	-4.60000	KI	0.00000		
Kpm	1.00000	Kc	0.05000		
Kim	0.00000	XI	0.00000		

OK Save Save to Aux Cancel Help Print

Object Dialog: Block Diagrams



- The “Show Block Diagram” button is available on the Stability tab of the individual dialogs for objects with Transient Stability models
- To view, click on the “Show Block Diagram” button



Block Diagrams



- The “Show Block Diagram” button is also available on the Model Explorer
- The block diagram document will be navigated to the page containing the model that is currently selected
- If “All” is selected, the list of the object models will open

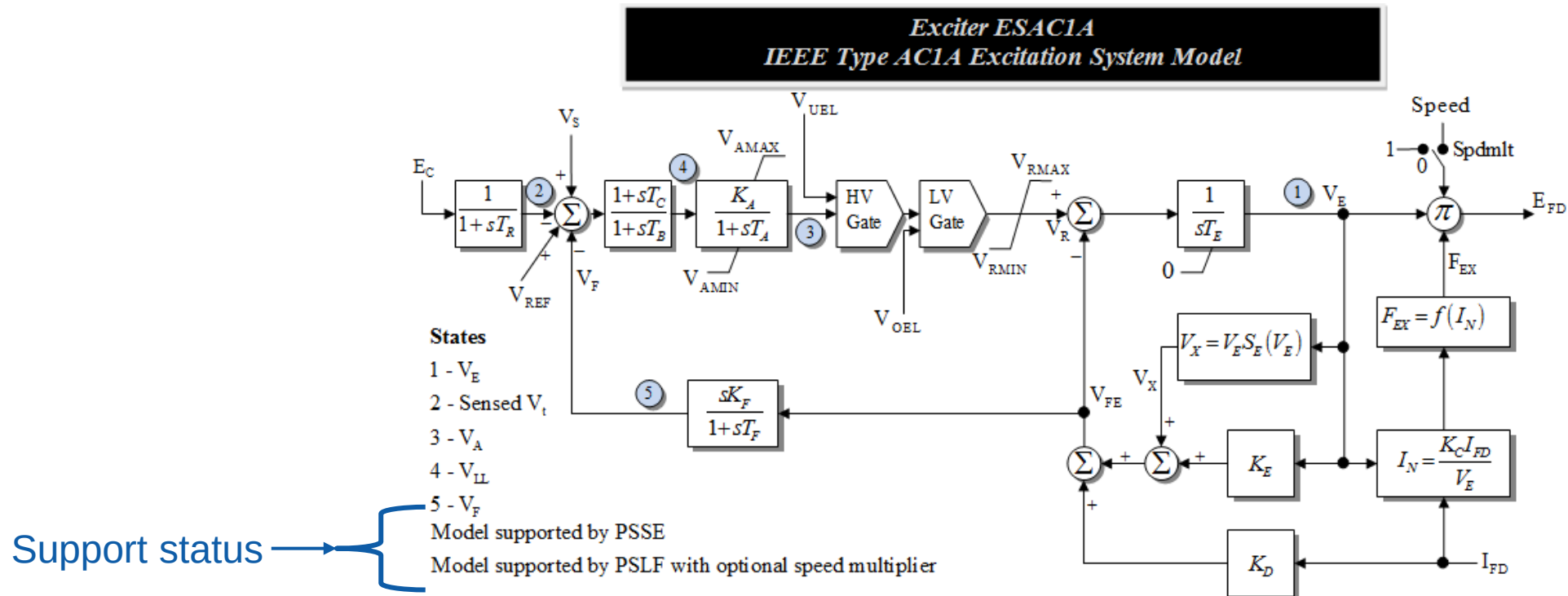
Click to show Block Diagrams

	Fully Supported	Number of Bus	ID	Name_Nominal kV of Bus	Area Name of Gen	Type	MVA Base	Device Status	C
1	YES	10246	1	PERSONG1_13.80	NEW MEXICO	EXST4B	170	Active	
2	YES	10261	1	REEVE_G1_13.80	NEW MEXICO	TEXS	58.822	Active	
3	YES	10262	1	REEVE_G2_13.80	NEW MEXICO	TEXS	58.822	Active	
4	YES	10263	1	REEVE_G3_13.80	NEW MEXICO	TEXS	88.235	Active	
5	YES	10318	1	SJUAN_G1_22.00	NEW MEXICO	EXAC3A	410	Active	
6	YES	10319	1	SJUAN_G2_24.00	NEW MEXICO	REXS	410	Active	
7	YES	10320	1	SJUAN_G3_22.00	NEW MEXICO	EXAC3A	616.7	Active	
8	YES	10320	1	SJUAN_G3_22.00	NEW MEXICO	ESAC2A	616.7	Not active	
9	YES	10321	1	SJUAN_G4_22.00	NEW MEXICO	EXAC3A	616.7	Active	
10	YES	10394	1	LEF_G1_18.00	NEW MEXICO	EXST4B	234	Active	
11	YES	10395	1	LEF_G2_18.00	NEW MEXICO	EXST4B	234	Active	
12	YES	10396	1	LEF_S1_18.00	NEW MEXICO	EXST4B	373	Active	
13	YES	10415	1	LVGT_13.80	NEW MEXICO	EXST2A	29.6	Active	
14	YES	10485	1	AFTONS_13.80	NEW MEXICO	EXAC2	143.6	Active	
15	YES	10486	1	AFTONG_18.00	NEW MEXICO	EXST4B	189	Active	
16	YES	10491	1	LRDSBG1_13.80	NEW MEXICO	REXS	60	Active	

Block Diagrams



- Standardized block diagram format
- States will be labeled to match how Simulator numbers them
- There will be comments regarding whether another software product supports the model



Object Dialog: Other Special Generator Options



- Set to Default and Defaults drop-down
- Option to enter values in Device MVA base or System MVA base

- Step-up Transformer Tab
- Terminal and State Tab
 - Bus/Setpoint Values
 - Terminal Values
 - More Tabs for various classes of models

GE DYD Special Handling



- Generator Baseload Flag
 - When loading GE EPC files, a flag for each generator record exists called the *Baseload flag* which determines how governor limits are handled during a transient stability run
 - Supported by a Simulator generator field called *Transient Stability\Governor Response Limits*- options are *Normal*, *Down Only*, or *Fixed*
 - *Baseload flag* of *0* maps to *Normal*, *Normal* means that the limits specified in the governor model will be used for the simulation
 - *Baseload flag* of *1* maps to *Down Only*, *Down Only* means that the upper limit is set equal to the initial condition value (and thus control can only go down.
 - *Baseload flag* of *2* or more maps to *Fixed*, *Fixed* means that both the upper and lower limits are set equal to the initial condition, thus control will be approximately constant
 - The *Governor Response Limits* field is shown when looking at governor case information displays

GE DYD Special Handling



- EPCMOD models
 - Often used to represent a user-defined model of a Series Capacitor Relay and a Capacitor Relay Model
 - Since these models were so common, PowerWorld added them as two new kinds of relay models
 - CAPRELAY can be assigned to a switched shunt record which, based on voltage, can open and close a switched shunt
 - Created when “MSC01.p” is read from an EPCMOD record
 - An appropriate log message will be written upon creation
 - SERIESCAPRELAY can allow a series capacitor to be bypassed during a fault and placed back in service when appropriate
 - Created when “MSC01.p” is read from an EPCMOD record
 - An appropriate log message will be written upon creation

GE DYD Special Handling



- CMPLDW models:
 - Automatically split into separate Load Distribution Equivalent Type and CMPLDWNF models when reading a DYD file
 - Individual loads are assigned to a Load Model Group containing the CMPLDWNF model
 - Long ID field in the EPC file determine the names of the Load Model Groups and Load Distribution Equivalent Types
 - Three characters for climate zone separated by an underscore followed by three characters for the feeder type
 - First three characters used to name Load Model Group
 - Last three characters used to name the Load Distribution Equivalent Type
 - “HID_RES” for High Desert climate zone with Residential feeder type

GE DYD Special Handling



- CMPLDW models:
 - Unique Load Distribution Equivalent Types
 - First 17 CMPLDW parameters
 - MVABase for the CMPLDW record
 - Last three characters (feeder type) of GE Long ID determine the Name
 - Name appended with numeric identifiers to ensure uniqueness
 - Unique Load Model Group
 - Parameters 18 through 129 of CMPLDW record
 - First three characters (climate zone) of GE Long ID determine the Name
 - Name appended with numeric identifiers to ensure uniqueness

GE DYD Special Handling

- CMPLDW models:

Model Explorer: Loads

Fields

Explore Fields

Find Field... Add -> -> Remove

Available Fields

- EPC File
- EPC Modification Status
- Flagged for Delete in EPC
- GE In Service Date
- GE Long ID
- GE Normal Status
- GE Project ID
- GE Retirement Date
- Fault Analysis
- Geography
- Geomagnetically Induced Current
- Island
- Labels
- MVA
- Mvar
- MW
- OPF
- OPF Input
- Owners
- PVQV
- Scheduled Actions
- Sensitivity of Bus
- Substation
- Super Area
- Time Step
- Topology
- Transient Stability
- Results
- Save
- Breaker Delay
- Load Characteristic Name (Motor)
- Load Characteristic Name (Motor) Used
- Load Characteristic Name (Static)
- Load Characteristic Name (Static) Used
- Load Distributed Generation MVABase
- Load Distributed Generation MVABase Used
- Load Distributed Generation Name
- Load Distributed Generation Name Used
- Load Distribution Equivalent MVABase
- Load Distribution Equivalent MVABase Used
- Load Distribution Equivalent Type
- Load Distribution Equivalent Type Used
- Load Model Group
- Load Relay Name

Expand Collapse

Frozen Columns 1

Reset to Factory Defaults

Number of Bus	Name of Bus	GE Long ID	Dist Equiv Type Used	Load Model Group
1	10009 ALCAZAR	HID_RES	HID_RES[Load]	HID_RES
2	10008 ALLISON	HID_COM	HID_COM[Load]	HID_COM
3	10013 ANDERSON	HID_RES	HID_RES[Load]	HID_RES
4	10015 ARNO_1	HID_RES	HID_RES[Load]	HID_RES
5	10017 ARRIBA	HID_RES	HID_RES[Load]	HID_RES
6	10020 ASPEN	HID_RES	HID_RES[Load]	HID_RES
7	10022 AVILA	HID_RES	HID_RES[Load]	HID_RES
8	10027 BACA	HID_MIX	HID_MIX[Load]	HID_MIX
9	10029 BALL_PRK	HID_RES	HID_RES[Load]	HID_RES
10	10032 BECKNER	HID_COM	HID_COM[Load]	HID_COM
11	10034 BEL_AIR	HID_RES	HID_RES[Load]	HID_RES
12	10036 ARNO_2	HID_RES	HID_RES[Load]	HID_RES
13	10037 FIRST_ST	HID_RES	HID_RES[Load]	HID_RES
14	10040 BEV_WOOD	HID_RES	HID_RES[Load]	HID_RES
15	10041 BISTI	HID_RAG	HID_RAG[Load]	HID_RAG
16	10043 BLCKRA	HID_RES	HID_RES[Load]	HID_RES
17	10046 BOSQUE_F	HID_RES	HID_RES[Load]	HID_RES
18	10049 BRADWAY	HID_COM	HID_COM[Load]	HID_COM
19	10050 BUCKMAN	HID_COM	HID_COM[Load]	HID_COM
20	10052 BURNHAM	HID_RAG	HID_RAG[Load]	HID_RAG
21	10053 CAMEL_TR	HID_COM	HID_COM[Load]	HID_COM
22	10056 CANYON	HID_RES	HID_RES[Load]	HID_RES
23	10058 CAPITOL	HID_COM	HID_COM[Load]	HID_COM
24	10061 CENTRAL_P	HID_RES	HID_RES[Load]	HID_RES
25	10064 CHURCH_R	HID_RES	HID_RES[Load]	HID_RES
26	10067 CLAREMNT	HID_COM	HID_COM[Load]	HID_COM
27	10068 CLAYTON	HID_RES	HID_RES[Load]	HID_RES
28	10070 COAL	HID_RES	HID_RES[Load]	HID_RES
29	10072 CINDWROCK	HID_COM	HID_COM[Load]	HID_COM
30	10073 COCHITI	HID_RES	HID_RES[Load]	HID_RES
31	10076 COLINAS	HID_RES	HID_RES[Load]	HID_RES
32	10078 COLLEGE	HID_RES	HID_RES[Load]	HID_RES
33	10081 CORNELL	HID_RES	HID_RES[Load]	HID_RES
34	10084 COTTONWD	HID_COM	HID_COM[Load]	HID_COM
35	10087 CUCHILLA	IND_OTH	IND_OTH[Load]	IND_OTH
36	10090 DEMING_W	HID_RES	HID_RES[Load]	HID_RES
37	10093 EASTRDGE	HID_RES	HID_RES[Load]	HID_RES
38	10097 EL_CERRO	HID_RES	HID_RES[Load]	HID_RES
39	10101 ELDORADO	HID_RES	HID_RES[Load]	HID_RES
40	10104 EMBUDO	HID_RES	HID_RES[Load]	HID_RES
41	10106 FOURHILL	HID_RES	HID_RES[Load]	HID_RES
42	10108 FT_MARCY	HID_RES	HID_RES[Load]	HID_RES
43	10111 GALLEGOS	HID_RAG	HID_RAG[Load]	HID_RAG
44	10112 GALLINAS	HID_RES	HID_RES[Load]	HID_RES
45	10115 GIRARD	HID_RES	HID_RES[Load]	HID_RES
46	10117 HALONA	HID_COM	HID_COM[Load]	HID_COM
47	10119 HAMLTN_1	HID_RES	HID_RES[Load]	HID_RES
48	10120 HAMLTN_2	HID_RES	HID_RES[Load]	HID_RES
49	10122 HAWKINS	HID_COM	HID_COM[Load]	HID_COM
50	10125 HAZELDIN	HID_RES	HID_RES[Load]	HID_RES
51	10127 HERMANAS	HID_RES	HID_RES[Load]	HID_RES
52	10129 HICKOX	HID_RES	HID_RES[Load]	HID_RES
53	10131 HONDALE	HID_RES	HID_RES[Load]	HID_RES
54	10136 IDFAI	IND_OTH	IND_OTH[Load]	IND_OTH



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