

# Transient Stability Analysis with PowerWorld Simulator

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## T6: Storage of Transient Stability Results



**PowerWorld**  
Corporation

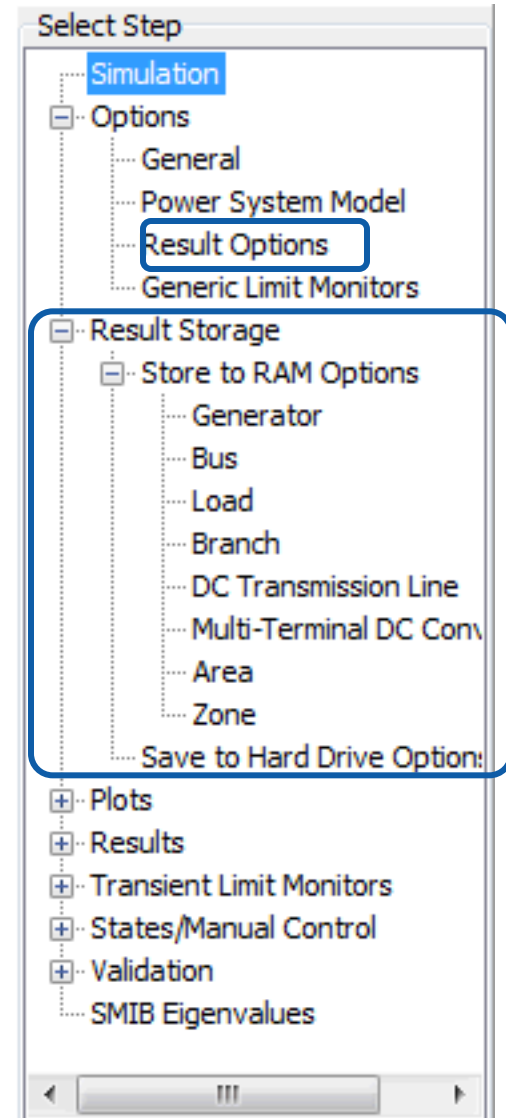
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<http://www.powerworld.com>

# Result Storage



- Result Options
- What results can be stored
- Where results can be saved
- How often to save results



# Transient Stability Options: Result Options



- Viewed from the Result Options tab of the Options page of the Transient Stability Analysis dialog
- When to Begin Checking Min/Max Values
  - When performing a fault, obviously the voltages will be very low during the fault
  - Do not start checking these values until after the last event to avoid reporting these values
  - This allows you to capture how values recover after a fault clears

Options

Note: Changes made to option entries are saved immediately and will be applied.

General Power System Model **Result Options** Generic Limit Monitors

Time to Begin Checking for Minimum and Maximum Results

After last event

Immediately

Custom Time 0.000

Angle Reference Options

Angle Reference

Average of Generator Angles

Weighted Average of Generator Angles

Specified Angle Reference Generator Terminal Angle

Specified Angle Reference Generator Internal Angle

Synchronous Reference Frame (No Angle Shift)

Angle Reference Generator 36410 (MORRO 4) #H Find...

Initialize with Reference Angle at Zero

Note: This reference is not used if infinite buses are modeled

# Transient Stability Options: Result Options



- Angle Reference
  - If the slack bus is an infinite bus, this option is not used
    - the slack bus angle is reference
  - Otherwise, this option is used
    - *Average of Generator Angles*: the average of all rotor angles in the system
    - *Weighted Average of Generator Angles*: the average of all rotor angles weighted by each generator's MVA base
    - *Specified Angle Reference Generator Terminal Angle*: the terminal bus angle of the specified generator
    - *Specified Angle Reference Generator Internal Angle*: the internal bus angle of the specified generator
    - *Synchronous Reference Frame (No Angle Shift)*: all rotor angles are reported on the synchronous reference frame.
- Initialize the Reference Angle at Zero
  - An additional constant shift is applied to all angles throughout the entire simulation. Shift is equal to the initial reference angle

Angle Reference Options

Angle Reference

- Average of Generator Angles
- Weighted Average of Generator Angles
- Specified Angle Reference Generator Terminal Angle
- Specified Angle Reference Generator Internal Angle
- Synchronous Reference Frame (No Angle Shift)

Angle Reference Generator 1 (Bus1) #1

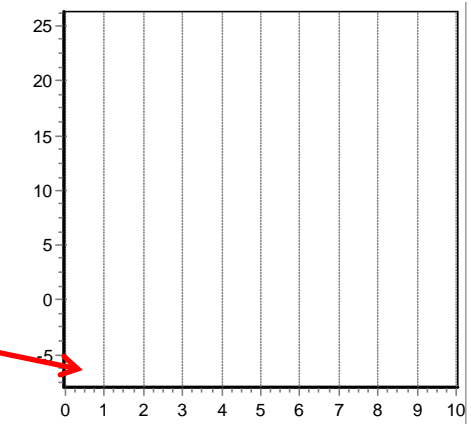
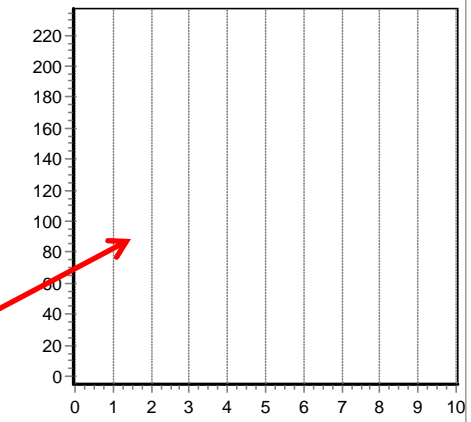
Initialize with Reference Angle at Zero

Note: This reference is not used if infinite buses are modeled

# Transient Stability Options: Result Options\Angle Reference



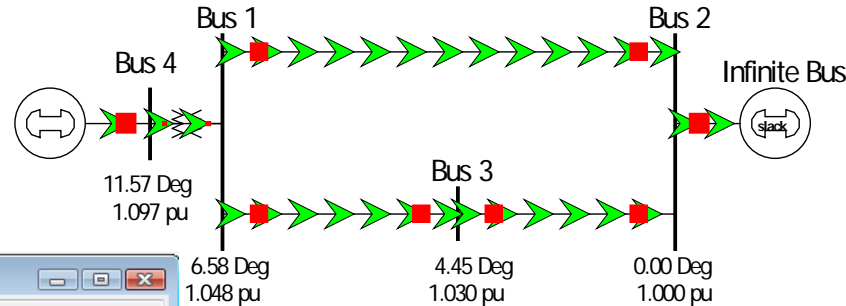
- Angle, No Shift shows the actual angles
  - Angles are with respect to a synchronous reference frame moving at nominal frequency
  - If actual frequency increases then the raw angles will all increase as time increase
  - System can still be stable as angle angles converge toward the same slope
- Angle field is with respect to a reference
  - The reference itself is calculated at every time step
  - Angle = Angle, No Shift – Reference
  - Angle plots for stable systems will converge toward a flat line.



# Result Storage



Open **Example\_13\_4\_WithPlot** –  
This case has already been set up



Transient Stability Analysis  
Simulation Status Finished at 10.000

Run Transient Stability Pause Abort For Contingency: My Transient Contingency

Select Step  
Simulation  
Options  
Result Storage  
Store to RAM Options  
Generator  
Bus  
Load  
Branch  
DC Transmission Line  
Multi-Terminal DC Converter  
Area  
Zone  
Save to Hard Drive Options

Plots  
Results  
Transient Limit Monitors  
States/Manual Control  
Validation  
SMIB Eigenvalues

Process Contingencies  
One Contingency at a time  
Multiple Contingencies

Save All Settings To Load All Settings From Show Transient Contour Toolbar Close

Result Storage  
Where to Save/Store Results Save Results Every n Timesteps:  
 Store Results to RAM  Save Results to Hard Drive 6 Load from Hard Drive File into RAM specified by Store to RAM Opti  
 Save the Results stored to RAM in the PWB file

Store to RAM Options Save to Hard Drive Options  
Note: All fields that are specified in a plot series of defined plot will also be stored to RAM.  
 Store Results for Open Devices Set All to NO for All Types Set Save All by Type ...

Generator	Bus	Load	Branch	DC Transmission Line	Multi-Terminal DC Converter	Area					
Set All NO							Records	Geo	Set	Columns	
From Selection:	Number of Bus	Name of Bus	ID	Area Name of Gen	Save All	Rotor Angle	Rotor Angle, No Shift	Speed	Mech Input		
1	2	Bus 2	1	Home	NO	NO	NO	NO	NO		
2	4	Bus 4	1	Home	NO	YES	NO	YES	NO		

Open the Transient Stability Analysis Dialog from the ribbon tab to the Result Storage page

# Determining the Results to Store for Viewing Afterward



For large cases, transient stability solutions can generate huge amounts of data. PowerWorld Simulator provides easy ways to choose which fields to save for later viewing. These choices can be made on the “Result Storage” page.

- Avoid storing too many values in RAM, or you may run out of memory and either cause the simulation to fail or slow down your computer
- If you need to save out a lot of data, saving to hard drive is a good option
  - After a run, you can still load results from hard drive back into RAM for viewing
  - Can visualize plot charts directly from the hard drive
- When using transient limit monitors, it may not be necessary to explicitly save any numerical results

# Result Storage Page: Options

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- On Result Storage page there are two check-boxes
  - Save Results to RAM
  - Save Results to Hard Drive
- Save Results Every n Timesteps
  - Results do not have to be stored for each time step. Increase this value to store them for only some timesteps
  - Note: This does NOT effect Max/Min Value Tracking, Generic Limit Monitoring, or Transient Limit Monitoring
    - They will always to look at every time step and report accordingly
- Save the Results stored to RAM in the PWB file
  - This can make the PWB pretty large



# Result Storage Page: Options



- Two tabs on the Result Storage page to support
  - Store to RAM Options
    - Toggle fields to save for each object
      - Note: object fields that are part of a plot definition (as discussed in the Plot Definition section) will always be treated as though the respective field is toggled to *YES*
    - Option to **Set All to NO for All Types**
    - Option to **Set Save All By Type**
  - Store to Hard Drive Options
    - Choose directory location in which to save
    - File name will be the contingency name with extension \*.TSR
    - Select object types to save
    - Area/Zone filters can be used to specify what to store
    - Note: An auxiliary file with the extension \*.AUX will also be saved which stores the Min/Max Values, Summary, Events, and Solution Details information for the contingency as well

# Result Storage Page



Where to save results

When to save results

Can save results with the PWB file, but size of the file may significantly increase

Scroll over to view which generator fields are currently saved

Simulation Status: Finished at 10.000

Run Transient Stability | Pause | Abort

For Contingency: My Transient Contingency

Select Step

- Simulation
- Options
  - Result Storage
    - Store to RAM Options
      - Generator
      - Bus
      - Load
      - Branch
      - DC Transmission Line
      - Multi-Terminal DC Converter
      - Area
      - Zone
    - Save to Hard Drive Options
  - Plots
  - Results
  - Transient Limit Monitors
  - States/Manual Control
  - Validation
  - SMIB Eigenvalues

Process Contingencies

One Contingency at a time

Multiple Contingencies

Result Storage

Where to Save/Store Results

Store Results to RAM

Save Results to Hard Drive

Save Results Every n Timesteps: 6

Load from Hard Drive File into RAM specified by Store to RAM Opti

Save the Results stored to RAM in the PWB file

Store to RAM Options | Save to Hard Drive Options

Note: All fields that are specified in a plot series of defined plot will also be stored to RAM.

Store Results for Open Devices | Set All to NO for All Types | Set Save All by Type ...

Generator	Bus	Load	Branch	DC Transmission Line	Multi-Terminal DC Converter	Area			
Set All NO									
Records Geo Set Columns									
From Selection:	Number of Bus	Name of Bus	ID	Area Name of Gen	Save All	Rotor Angle	Rotor Angle, No Shift	Speed	Mech Input
Make Plot	1	2 Bus 2	1	Home	NO	NO	NO	NO	NO
Make Plot Group by Field	2	4 Bus 4	1	Home	NO	YES	NO	YES	NO
Make Plot	←								

Save All Settings To | Load All Settings From | Show Transient Contour Toolbar | Close

# Save Results To RAM



Select what objects and fields to store to from the RAM Options tab

Many tabs are available here which correspond to different object types

Generator Tab

Generator Tab

From Selection:

Number of Bus	Name of Bus	ID	Area Name of Gen	Save All	Rotor Angle	Rotor Angle, No Shift	Speed	Mech Input	MW Terminal	Accel MW	Mvar Terminal	Term. PL	Field Voltage (pu)	Field Current	Stabilizer Vs	States of Machine
1	2 Bus 2	1	Home	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2	4 Bus 4	1	Home	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	NO	NO

Toggle which fields to store

Each object type has many different fields that may be saved, including any dynamic states

Rotor Angle, Speed, Terminal MW, Terminal MVAR, and Field Voltage are currently being saved for Generator 4

# Save Results to RAM



Result Storage

Where to Save/Store Results

Store Results to RAM

Save Results to Hard Drive

Save Results Every n Timesteps: 6

Load from Hard Drive File into RAM results specified by Store to RAM Options

Save the Results stored to RAM in the PWB file

Store to RAM Options | Save to Hard Drive Options

Note: All fields that are specified in a plot series of defined plot will also be stored to RAM.

Store Results for Open Devices

Set All to NO for All Types | Set Save All by Type ...

Generator | Bus (ignore prefilter) | Load | Branch | DC Transmission Line | Multi-Terminal DC Converter

Set All NO

From Selection:	Number	Name	Area Name	Save All	V (pu)	Angle	Angle, No Shift	Gen MW Total	Gen Mvar Total	L	T
	1	Bus 1	Home	NO	NO	NO	NO	NO	NO	N	T
	2	Bus 2	Home	NO	NO	NO	NO	NO	NO	N	T
	3	Bus 3	Home	NO	NO	NO	NO	NO	NO	N	T
	4	Bus 4	Home	NO	YES	NO	NO	NO	NO	N	T

Make Plot

Make Plot Group by Field

Make Plot Group by Object

Change Save All by Type

Types of Devices

- Area
- Branch
- Bus
- DC Transmission Line
  - States of DC Line
- Generator
  - States of Exciter
  - States of Machine
  - States of Governor
  - States of Stabilizer
- Load
  - States of Load
- Multi-Terminal DC Converter
- Zone

Apply only to devices meeting the area/zone filters

OK Cancel

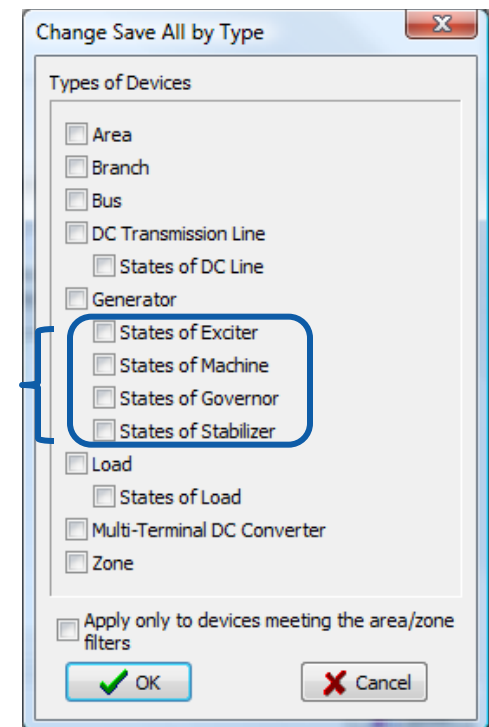
Toggle all to NO for the current object type or for all object types

Choose types for which to toggle the "Save All" column to YES

# Dynamic States, Inputs, and Other Fields



- Later in the Plot Designer, you will see that some types of objects can have dynamic models
  - States
  - Inputs
  - Other Fields
- For the purpose of Result Storage, if you set *States of \*\*\** to YES, then States, Inputs, and Other Fields are all stored.



# Results: Time Values From RAM



Click “Run Transient Stability”

The results saved to RAM will appear in the Results tab

There are many options for filtering and viewing results - discussed in the Reviewing Results section

Transient Stability Analysis  
Simulation Status: Finished at 10.000

Run Transient Stability   Pause   Abort   For Contingency: My Transient Contingency

Select Step

- Simulation
- Options
- Result Storage
  - Store to RAM Options
    - Generator
    - Bus
    - Load
    - Branch
    - DC Transmission Line
    - Multi-Terminal DC Conv.
    - Area
    - Zone
  - Save to Hard Drive Options
- Plots
- Results
  - Time Values From RAM**
  - Minimum/Maximum Values
  - Summary
  - Events
  - Solution Details
- Transient Limit Monitors
- States/Manual Control
- Validation
- SMIB Eigenvalues

Process Contingencies

One Contingency at a time (selected)   Multiple Contingencies

Save All Settings To   Load All Settings From   Show Transient Contour Toolbar

Results

Time Values From RAM   Minimum/Maximum Values   Summary   Events   Solution Details

Generator	Bus	Load	Branch	DC Transmission Line	Multi-Terminal DC Converter	Area	Zone	
Column Order	Object then Field							
Column Filtering	Filter   Modify...							
<input type="checkbox"/>	Use Area/Zone Filters							
Choose Fields to Dis...	<input checked="" type="checkbox"/> Accel MW <input checked="" type="checkbox"/> Field Current <input checked="" type="checkbox"/> Field Voltage (pu) <input checked="" type="checkbox"/> Mech Input <input checked="" type="checkbox"/> Mvar Terminal <input checked="" type="checkbox"/> MW Terminal <input checked="" type="checkbox"/> Rotor Angle <input checked="" type="checkbox"/> Rotor Angle, No S... <input checked="" type="checkbox"/> Speed <input checked="" type="checkbox"/> Stabilizer Vs <input checked="" type="checkbox"/> States of Exciter <input checked="" type="checkbox"/> States of Governor <input type="checkbox"/> States of Medicine							
<input type="button" value="Check All"/>	<input type="button" value="Uncheck All"/>	Load from Hard Drive File into RAM results specified by Store to RAM Options						
Time	Gen Bus 4 #1 Rotor Angle	Gen Bus 4 #1 Speed	Gen Bus 4 #1 MW Terminal	Gen Bus 4 #1 Mvar Terminal	Gen Bus 4 #1 Field Voltage (pu)			
1	0	30.047	60	100	58.53	2.71		
2	0.05	30.047	60	100	58.53	2.71		
3	0.1	30.047	60	100	58.53	2.71		
4	0.15	30.047	60	100	58.53	2.71		
5	0.2	30.047	60	100	58.53	2.71		
6	0.25	30.047	60	100	58.53	2.71		
7	0.3	30.047	60	100	58.53	2.71		
8	0.35	30.047	60	100	58.53	2.71		
9	0.4	30.047	60	100	58.53	2.71		
10	0.45	30.047	60	100	58.53	2.71		
11	0.5	30.047	60	100	58.53	2.71		
12	0.55	30.047	60	100	58.53	2.71		
13	0.6	30.047	60	100	58.53	2.71		
14	0.65	30.047	60	100	58.53	2.71		
15	0.7	30.047	60	100	58.53	2.71		
16	0.75	30.047	60	100	58.531	2.71		
17	0.8	30.047	60	100	58.531	2.71		
18	0.85	30.047	60	100	58.531	2.71		
19	0.9	30.047	60	100	58.531	2.71		
20	0.95	30.047	60	100	58.531	2.71		
21	1	30.047	60	100	58.531	2.71		
22	1	30.047	60	65.385	43.676	2.71		
23	1.05	32.61	60.274	50.94	170.981	2.791		
24	1.1	39.613	60.495	61.81	164.09	2.879		
25	1.15	50.08	60.657	74.662	158.172	2.964		
26	1.2	62.902	60.757	87.151	151.785	3.046		
27	1.25	77.001	60.802	96.325	144.549	3.125		

# Save Results to Hard Drive



Open the Save to Hard Drive Options tab

Select  
“Save  
Results to  
Hard Drive”

It's  
possible  
to save to  
both RAM  
AND Hard  
Drive

Transient Stability Analysis  
Simulation Status Finished at 20.000

Run Transient Stability Pause Abort Restore Reference For Contingency: My Transient Contingency

Select Step

- Simulation
- Options
  - General
  - Power System Model
  - Result Options
  - Generic Limit Monitors
  - Distributed Computing
  - Result Storage**
    - Store to RAM Options
    - Save to Hard Drive Options
  - Plots
    - Plot Designer
    - Plot Definition Grids
  - Results from RAM
    - Time Values
    - Minimum/Maximum Values
    - Summary
    - Events
    - Solution Details
    - Transient Limit Monitors
    - States/Manual Control
    - Validation
    - SMIB Eigenvalues

Process Contingencies

One Contingency at a time  
 Multiple Contingencies

Result Storage

Where to Save/Store Results

Store Results to RAM  
 Save Results to Hard Drive  
 Save the Results stored to RAM in the PWB file

Save Results Every n Timesteps: 1

Load from Hard Drive File into RAM results specified by Store to RAM Options

Store to RAM Options Save to Hard Drive Options

Directory in which to store all results TSR files for all contingencies

Location c:\temp\transient results Browse...

For each transient contingency, one file will be written to this directory. The filename will be the name of the contingency with the \*.TSR file extension. Note: If no directory is specified, then the director of the case file will be used. Note: Using a directory on your local computer is recommended.

Object Types to Include

- Generators
- Buses
- Loads
- Switched Shunts
- Branches
- DC Lines
- Multi-Terminal DC
- MTDC Converters
- Areas
- Zones
- Interfaces
- Injection Groups

Only store every result for objects which meet the Area/Zone Filters  
Edit Area/Zone Filters

TSR File Archiving

Enable Auto-Archive of TSR Files  
Maximum Number of Archive Files 6

Specify directory for  
saving the results

Area/Zone Filters may be used

Specify what objects to save

# Save Results to Hard Drive

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- The only options for storing results to the Hard Drive are
  - Specify Object Types
  - Filter by Area/Zone/Owner Filters
- What fields are stored to the \*.TSR file?
  - All stability fields
  - All dynamic model states
  - All dynamic model inputs
  - All dynamic model other fields
- TSR File Archiving
  - When a new set of results are created, old TSR files will be archived using a file name of type
    - *MyFileName\_1.tsr, MyFileName\_2.tsr, etc...*



# Load from Hard Drive



Simulation Status Finished at 10.000

Run Transient Stability Pause Abort For Contingency: My Transient Contingency

Select Step

- Simulation
- Options
- Result Storage
  - Store to RAM Options
    - Generator
    - Bus
    - Load
    - Branch
    - DC Transmission Line
    - Multi-Terminal DC Converter
    - Area
    - Zone
  - Save to Hard Drive Options
- Plots
- Results
  - Time Values From RAM
  - Minimum/Maximum Values
  - Summary
  - Events
  - Solution Details
- Transient Limit Monitors
- States/Manual Control
- Validation
- SMIB Eigenvalues

Process Contingencies

- One Contingency at a time
- Multiple Contingencies

Save All Settings To Load All Settings From Show Transient Contour Toolbar

When saving to Hard Drive, results will not automatically be shown

Time	Gen Bus 4 #1 Rotor Angle	Gen Bus 4 #1 Speed	Gen Bus 4 #1 MW Terminal	Gen Bus 4 #1 Mvar Terminal	Gen Bus 4 #1 Field Voltage (pu)
1	0	30.047	60	100	58.53
2	0.05	30.047	60	100	58.53
3	0.1	30.047	60	100	58.53
4	0.15	30.047	60	100	58.53
5	0.2	30.047	60	100	58.53
6	0.25	30.047	60	100	58.53
7	0.3	30.047	60	100	58.53
8	0.35	30.047	60	100	58.53
9	0.4	30.047	60	100	58.53
10	0.45	30.047	60	100	58.53
11	0.5	30.047	60	100	58.53
12	0.55	30.047	60	100	58.53
13	0.6	30.047	60	100	58.53
14	0.65	30.047	60	100	58.53
15	0.7	30.047	60	100	58.53
16	0.75	30.047	60	100	58.531
17	0.8	30.047	60	100	58.531
18	0.85	30.047	60	100	58.531
19	0.9	30.047	60	100	58.531
20	0.95	30.047	60	100	58.531
21	1	30.047	60	100	58.531
22	1	30.047	60	38.462	188.705
23	1.05	30.047	60	100	58.531
24	1.1	30.047	60	100	58.531

Load from Hard Drive File into RAM results specified by Store to RAM Options

Click to load back in from Hard Drive in order to view the results in Simulator

This button is also available on the "Save to Hard Drive Options" Tab

# Result Storage Example

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- Open **TS9Bus Bus Fault.pwb**
- Go to Run Mode and open Transient Stability
- Go to the Result Storage page
- Case is configured to Store Results to RAM
  - *Save All* = YES for all generators
  - *Save All* = YES for all buses
- Click **Run Transient Stability**
- To see what's stored in RAM and the Hard-Drive you can go to the Plots page or the Results page

# Result Storage: Plots



## Device Type = *Bus*

Plot Designer Plot Definition Grids

Device Type: Bus

Choose Fields

- Angle
- Angle, No Shift
- Frequency
- Gen Mvar Total
- Gen MW Total
- Load Mvar Total
- Load MW Total
- V (pu)

Choose Objects

Sort by: Name (selected) Number

- Bus 2 (2) [18 kV]
- Bus 3 (3) [13.8 kV]
- Bus 4 (4) [230 kV]
- Bus 5 (5) [230 kV]
- Bus 6 (6) [230 kV]
- Bus 7 (7) [230 kV]
- Bus 8 (8) [230 kV]
- Bus 9 (9) [230 kV]
- Bus1 (1) [16.5 kV]

Select All Clear All

Show only objects available in results

**Green Text  
= in RAM**

## Device Type = *Load*

Plot Designer Plot Definition Grids

Device Type: Load

Choose Fields

- Bus Volt Angle (deg)
- Bus Volt Mag (pu)
- Load Current (pu)
- Load Current Angle
- MVA Load
- Mvar Load
- MW Load
- Other Fields of Load

Choose Objects

Sort by: Name (selected) Number

- Bus 5 (5) #1 [230 kV]
- Bus 6 (6) #1 [230 kV]
- Bus 8 (8) #1 [230 kV]

Select All Clear All

Show only objects available in results

**Black Text  
= not in RAM**

# Results Storage: Results\Time Values From RAM



## Device Type = *Bus*

Results

Time Values From RAM | Minimum/Maximum Values | Summary | Events | Solution Details

Generator **Bus** Load Branch DC Transmission Line Multi-Terminal DC Converter Area Zone

Column Order: Object then Field

Column Filtering: Filter [Modify...]

Use Area/Zone Filters:

Choose Fields to Display:

- Angle
- Angle, No Shift
- Frequency
- Gen Mvar Total
- Gen MW Total
- Load Mvar Total
- Load MW Total
- V (pu)

Load from Hard Drive File into RAM results specified by Store to RAM Options

Time	Bus Bus1 V (pu)	Bus Bus1 Angle	Bus Bus1 Frequency	Bus Bus1 Gen MW Total	Bus Bus1 Gen Mvar Total
1	0	1.04	0	60	71.645
2	0.02	1.04	0	60	71.645
3	0.04	1.04	0	60	71.645
4	0.06	1.04	0	60	71.645
5	0.08	1.04	0	60	71.645
6	0.1	1.04	0	60	71.645
7	0.12	1.04	0	60	71.645
8	0.14	1.04	0	60	71.645
9	0.16	1.04	0	60	71.645
10	0.18	1.04	0	60	71.645
11	0.2	1.04	0	60	71.645
12	0.22	1.04	0	60	71.645
13	0.24	1.04	0	60	71.645
14	0.26	1.04	0	60	71.645
15	0.28	1.04	0	60	71.645
16	0.3	1.04	0	60	71.645
17	0.32	1.04	0	60	71.645
18	0.34	1.04	0	60	71.645
19	0.36	1.04	0	60	71.645
20	0.38	1.04	0	60	71.645

**Results**

## Device Type = *Load*

Results

Time Values From RAM | Minimum/Maximum Values | Summary | Events | Solution Details

Generator Bus **Load** Branch DC Transmission Line Multi-Terminal DC Converter Area Zone

Column Order: Object then Field

Column Filtering: Filter [Modify...]

Use Area/Zone Filters:

Choose Fields to Display:

- Bus Volt Angle (deg)
- Bus Volt Mag (pu)
- Load Current (pu)
- Load Current Angle
- MVA Load
- Mvar Load
- MW Load
- States of Load

Load from Hard Drive File into RAM results specified by Store to RAM Options

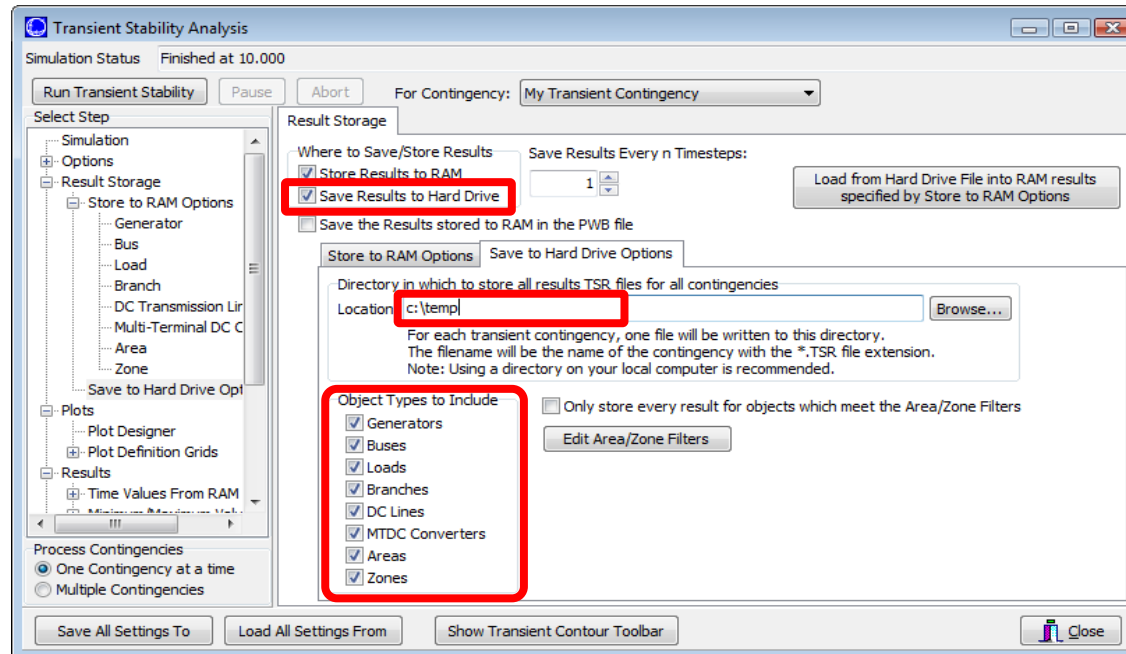
Time	Value
1	0
2	0.02
3	0.04
4	0.06
5	0.08
6	0.1
7	0.12
8	0.14
9	0.16
10	0.18
11	0.2
12	0.22
13	0.24
14	0.26
15	0.28
16	0.3
17	0.32
18	0.34
19	0.36
20	0.38
21	0.4
22	0.42
23	0.44

**No Results**

# Result Storage: Save Results to Hard Drive



- Configure to Store Results to Hard Drive

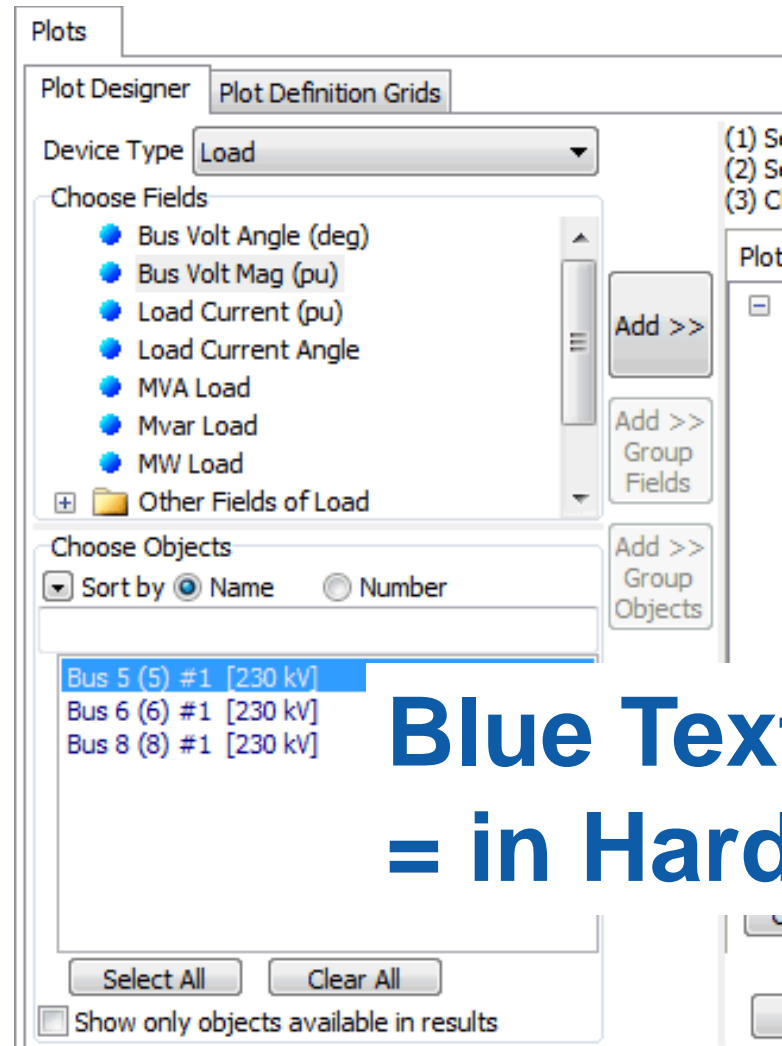


- Click **Run Transient Stability** again.
- Navigate in Windows Explorer to see that the TSR file has been created

# Result Storage: Hard Drive



- Plot Designer –  
Hard Drive Results  
objects in Blue
  - These results may  
be plotted directly
- Time Values From  
RAM
  - Still not available



# Load Hard Drive Results into the RAM Results



- Possible to load results from Hard Drive for viewing in tables
  - Go back to Results Storage, Store to RAM Options
  - Go to Load
  - Specify *Save All* = YES for all loads
  - Click **Load from Hard Drive File into RAM ...**

Result Storage

Where to Save/Store Results:  Store Results to RAM  Save Results to Hard Drive Save Results Every n Timesteps: 1

Save the Results stored to RAM in the PWB file

Store to RAM Options Save to Hard Drive Options

Note: All fields that are specified in a plot series of defined plot will also be stored to RAM.

Store Results for Open Devices Set All to NO for All Types Set Save All by Type ...

Generator Bus **Load** Branch DC Transmission Line Multi-Terminal DC Converter Area Zone

Set All NO

From Selection:	Number of Bus	Name of Bus	Area Name of Load	ID	Save All	MW Load	Mvar Load	MVA Load	Bus Volt Mag (pu)	Bus Volt Angle (deg)	Load Current (pu)	Load Current Angle
1	5	Bus 5	1	1	YES	O	NO	NO	NO	NO	NO	N
2	6	Bus 6	1	1	YES	O	NO	NO	NO	NO	NO	N
3	8	Bus 8	1	1	YES	O	NO	NO	NO	NO	NO	N

# Load Hard Drive Results into the RAM Results



- Plots, Green Text for objects
- **Time Value From RAM** – available

Plots

Plot Designer Plot Definition Grids

Device Type Load

Choose Fields

- Bus Volt Angle (deg)
- Bus Volt Mag (pu)
- Load Current (pu)
- Load Current Angle
- MVA Load
- Mvar Load

Choose Objects

Sort by  Name  Number

Bus 5 (5) #1 [230 kV]  
 Bus 6 (6) #1 [230 kV]  
 Bus 8 (8) #1 [230 kV]

Select All Clear All

Show only objects available in results

Results

Time Values From RAM Minimum/Maximum Values Summary Events Solution Details

Generator Bus Load Branch DC Transmission Line Multi-Terminal DC Converter Area Zone

Column Order  
Object then Field

Column Filtering  
Filter Modify...

Use Area/Zone Filters

Choose Fields to Display

- Bus Volt Angle (deg)
- Bus Volt Mag (pu)
- Load Current (pu)
- Load Current Angle
- MVA Load
- Mvar Load
- MW Load
- States of Load

Check All Uncheck All

Load from Hard Drive File into RAM results specified by Store to RAM Options

Time	Load Bus 5 #1 MW Load	Load Bus 5 #1 Mvar Load	Load Bus 5 #1 MVA Load	Load Bus 5 #1 Bus Volt Mag (pu)	Load Bus 5 #1 Bus Volt Angle (deg)
1	0	125	50	134.629	0.996
2	0.02	125	50	134.629	0.996
3	0.04	125	50	134.629	0.996
4	0.06	125	50	134.629	0.996
5	0.08	125	50	134.629	0.996
6	0.1	125	50	134.629	0.996
7	0.12	125	50	134.629	0.996
8	0.14	125	50	134.629	0.996
9	0.16	125	50	134.629	0.996
10	0.18	125	50	134.629	0.996
11	0.2	125	50	134.629	0.996
12	0.22	125	50	134.629	0.996
13	0.24	125	50	134.629	0.996
14	0.26	125	50	134.629	0.996
15	0.28	125	50	134.629	0.996
16	0.3	125	50	134.629	0.996
17	0.32	125	50	134.629	0.996
18	0.34	125	50	134.629	0.996
19	0.36	125	50	134.629	0.996



# Plotting Results and Result Storage



- Bringing data into “RAM” is not necessary for creating plots
- When you choose to create plots as will be discussed shortly the following hierarchy is followed for each *plot series*
  - Result stored in RAM are used first
  - If RAM not available, results stored to Hard Drive are used
  - Finally, if still no results, nothing is plotted.
- Thus one chart, could contain information from RAM and from Hard Drive

# Plotting Results and Result Storage

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- Instructor – play around with plots to show results storage

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