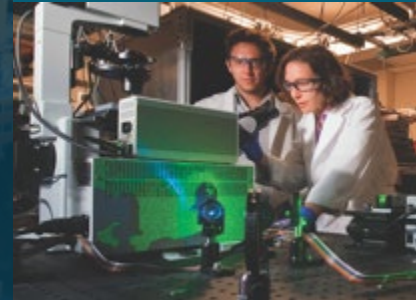


# MELCOR Uncertainty Analysis with SNAP & DAKOTA



PRESENTED BY

Larry Humphries

## 2 SNAP/DAKOTA Uncertainty Analysis

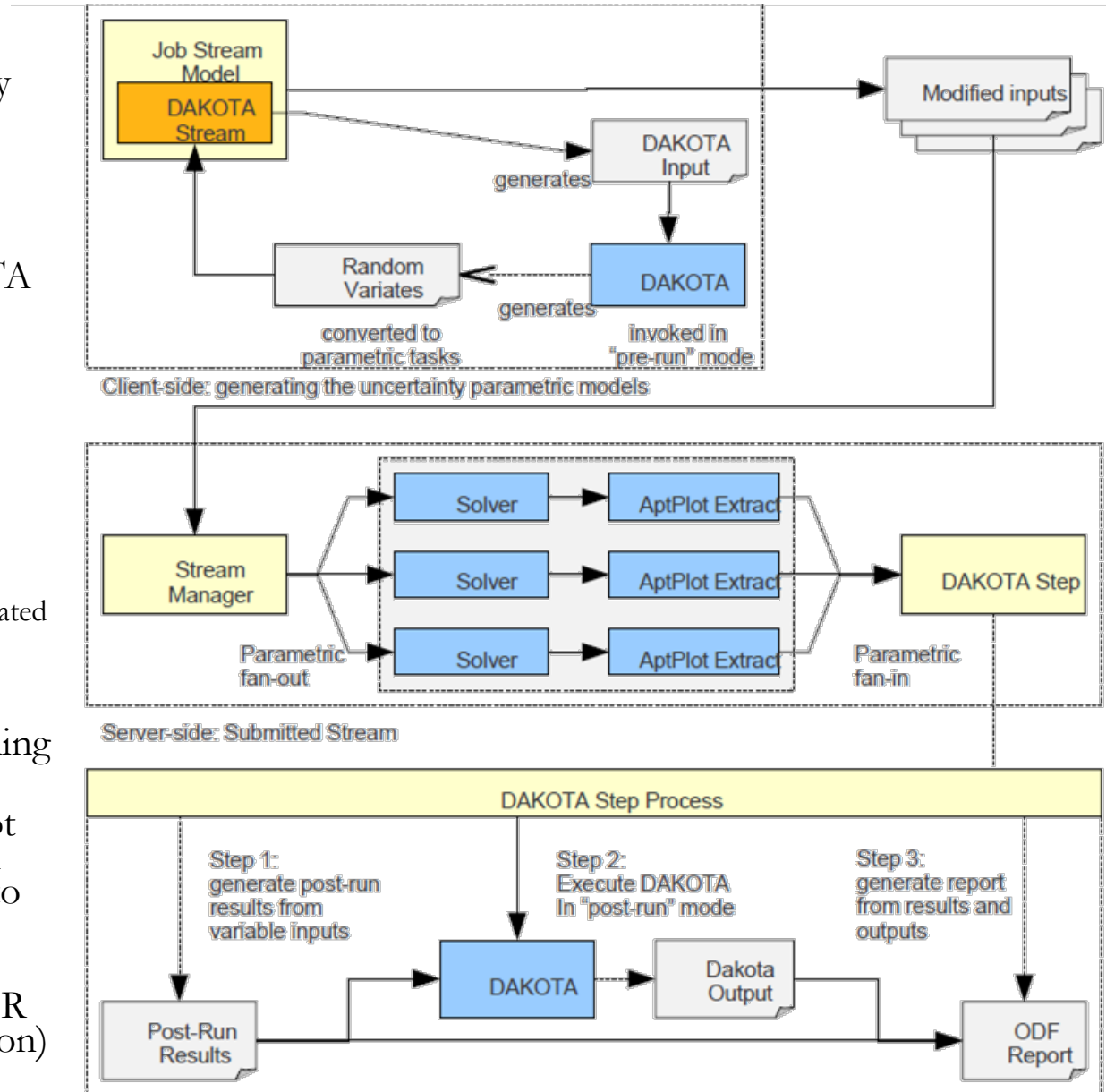


### Pros

- SNAP provides access to MELCOR's extensive inventory of sensitivity coefficients and input parameters.
- Rich set of parameter distributions to choose from.
- Graphical interface to DAKOTA input
- Familiar SNAP interface
  - Input, post-processing, UA
  - MELCOR, RELAP, TRACE, COBRA, CONTAIN, FRAPCON, PARCS
- All-in-one solution for UA
  - SNAP schedules multi-parameter runs after setup
  - SNAP prepares statistical report generated upon job completion

### Cons

- SNAP has relatively steep learning curve for beginner
- Failed runs (realizations) are not accounted for and no statistical report is generated. They lead to an incomplete job with no diagnostics to user.
- Input decks with new MELCOR models (relative to SNAP version) cannot be used

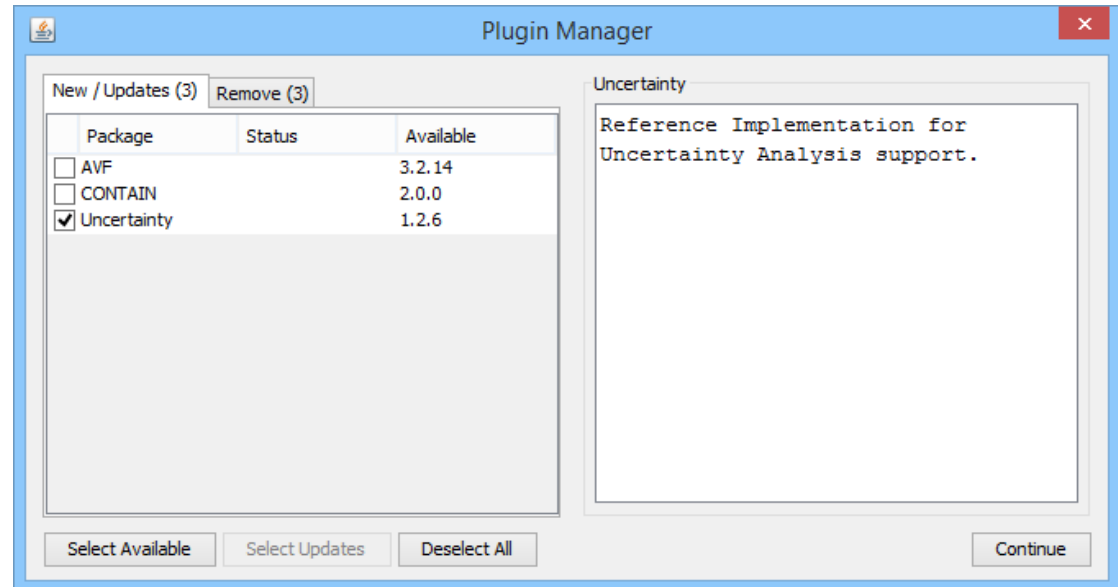


# Performing a Sensitivity Study with SNAP

## Step I – Downloading Dakota Plugin

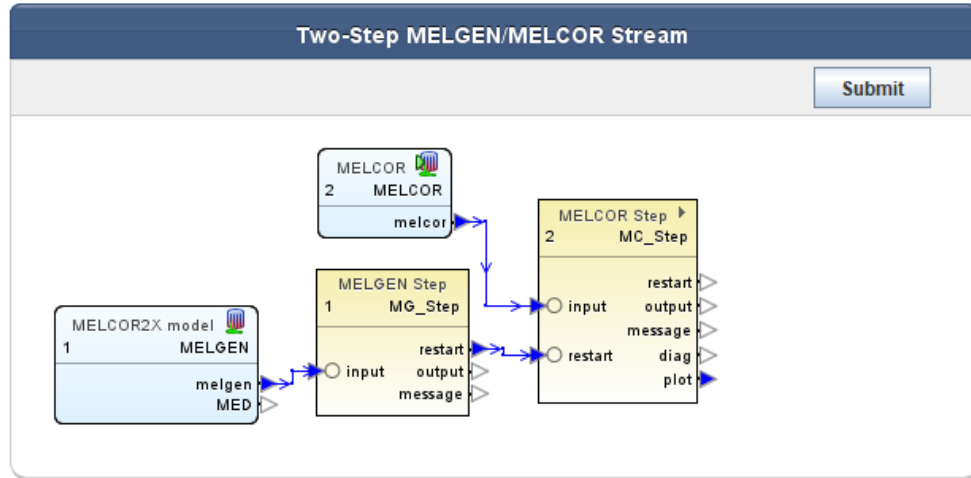


1. Select Dakota plugin during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

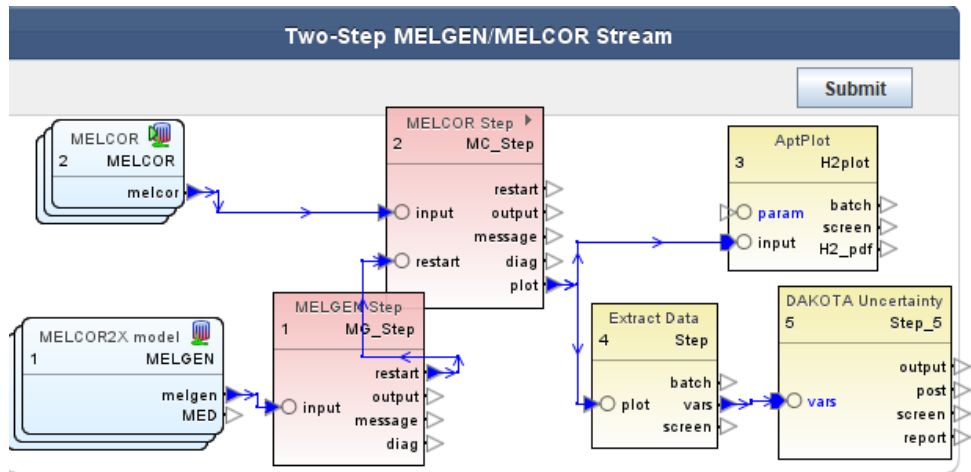




### MELGEN/MELCOR Two-Step



### MELGEN/MELCOR Two-Step & Dakota



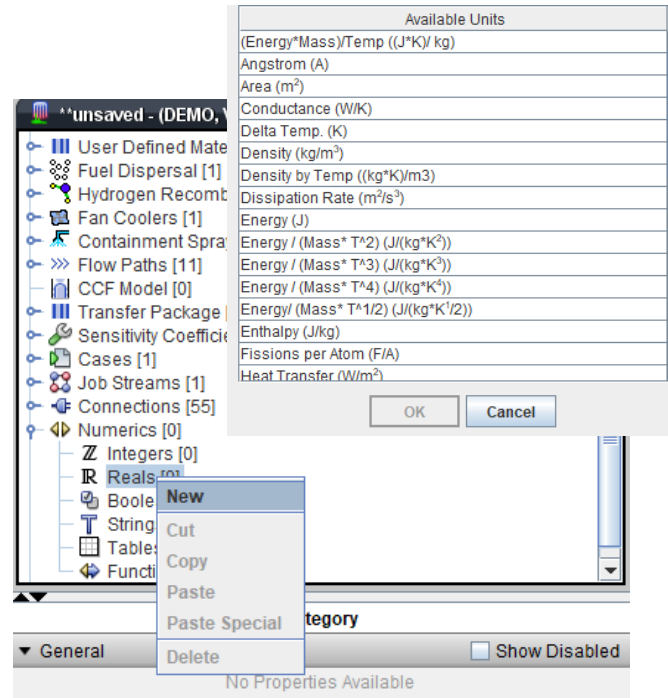
# Performing a Sensitivity Study with SNAP

## Step 2 – Adding a Numeric (I)

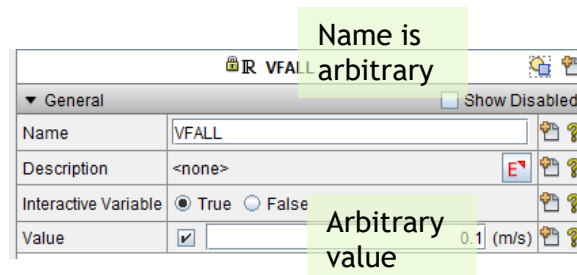
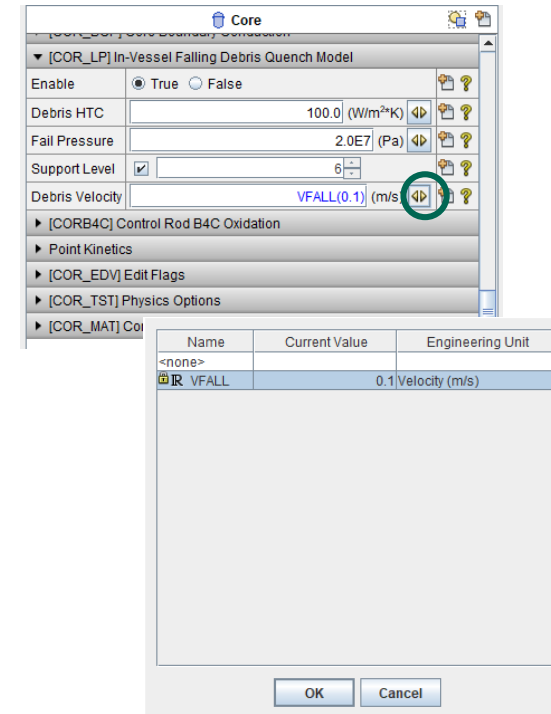


1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

### Create the Numeric



### Connect Numeric to Input



# Performing a Sensitivity Study with SNAP

## Step 2 – Adding a Numeric

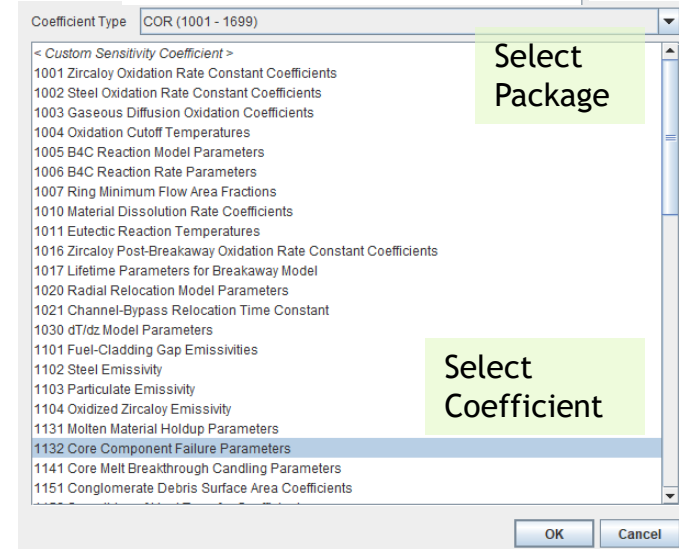
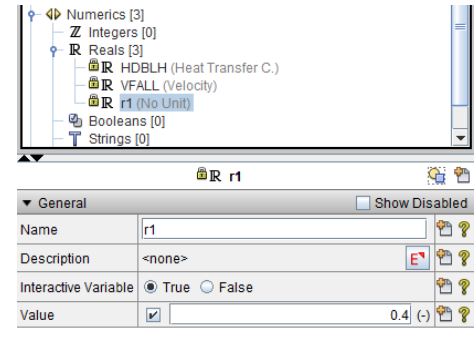
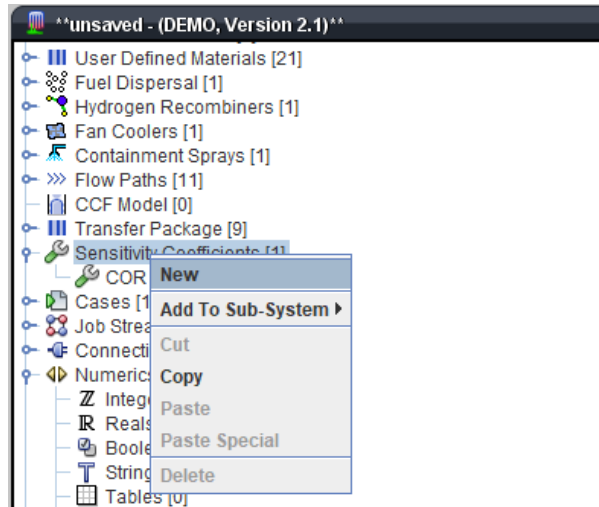
### 6 Sensitivity Coefficient as an uncertain parameter (2)



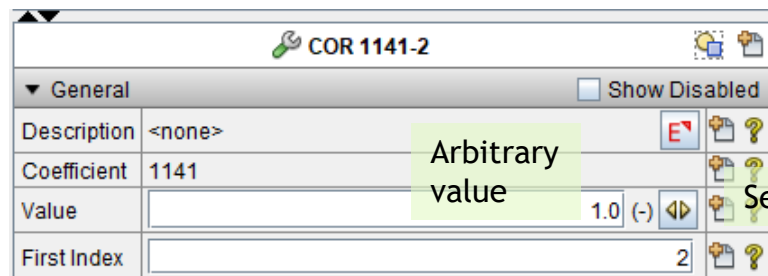
1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

First create a new numeric r1, which has no units.

Then add the sensitivity coefficient to the model database.



Properties Window



# Performing a Sensitivity Study with SNAP

## Step 3 – Assign the New Numeric a value



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

The screenshot shows the SNAP software interface. The top window is titled "Select a Shared Real" and contains a table with the following data:

Name	Current Value	Engineering Unit
<none>		
IR r1	0.4	No Unit (-)

Below the table are "OK" and "Cancel" buttons. The background shows a tree view of the model structure with "CVH 4407-11" selected under "Sensitivity Coefficients". The bottom panel shows the properties for "CVH 4407-11":

CVH 4407-11	
General	
Description	<none>
Coefficient	4407
Value	r1(0.4) (-)
First Index	11

A red circle highlights the "Value" field, which contains "r1(0.4) (-)".

# Performing a Sensitivity Study with SNAP

## Step 4 – Dakota Job Stream (I)



1. Select Dakota plugin during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

The screenshot shows a tree view of model components on the left. A context menu is open over the 'Job Stream' node, with the following options:

- New
- Add To Sub-System
- Create View
- Add To View
- Change Order
- Cut
- Copy
- Paste
- Paste Special
- Delete

The tree view includes the following items:

- User Defined Materials [21]
- Fuel Dispersal [1]
- Hydrogen Recombiners [1]
- Fan Coolers [1]
- Containment Sprays [1]
- Flow Paths [11]
- CCF Model [0]
- Transfer Package [9]
- Sensitivity Coefficients [1]
- Cases [1]
- Job Stream [1]
- Con...
- Nun...
- View

Below the tree view, there are tabs for 'General' and 'Category'. The 'General' tab is active, showing a checkbox for 'Show Disabl' and the text 'ties Available'.

The screenshot shows the 'Job Stream' configuration dialog box. It contains the following sections:

- Basic Stream**: A simple job stream.
- Template**: Select from one of the previously saved templates.
- Numeric Combination**: The numeric combination builds a set of input models by modifying the value of one or more input shared numeric values. Each selected shared numeric will either iterate through a list of predefined values or increment from a start value to an end value.
- Tabular Parametric**: The parametric case takes the form of a table of shared variable values.
- DAKOTA Uncertainty**: Uncertainty support for the DAKOTA toolkit. This option is selected.

At the bottom, there is a checkbox labeled 'Create new a view for this Job Stream.' which is checked. Below the checkbox are four buttons: 'Back', 'Next', 'Finish', and 'Cancel'.



# Performing a Sensitivity Study with SNAP

## Step 4 – Dakota Job Stream (2)



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

◆ Basic Stream  
A simple job stream.

🔗 Template  
Select from one of the previously saved templates.

📄 Numeric Combination  
The numeric combination builds a set of input models by modifying the value of one or more input shared numeric values. Each selected shared numeric will either iterate through a list of predefined values or increment from a start value to an end value.

📄 Tabular Parametric  
The parametric case takes the form of a table of shared variable values.

🔍 DAKOTA Uncertainty  
Uncertainty support for the DAKOTA toolkit.

Create new a view for this Job Stream.

◀ Back Next ▶ Finish Cancel

🔗 An Empty Stream  
A new Job Stream with a Model Node.

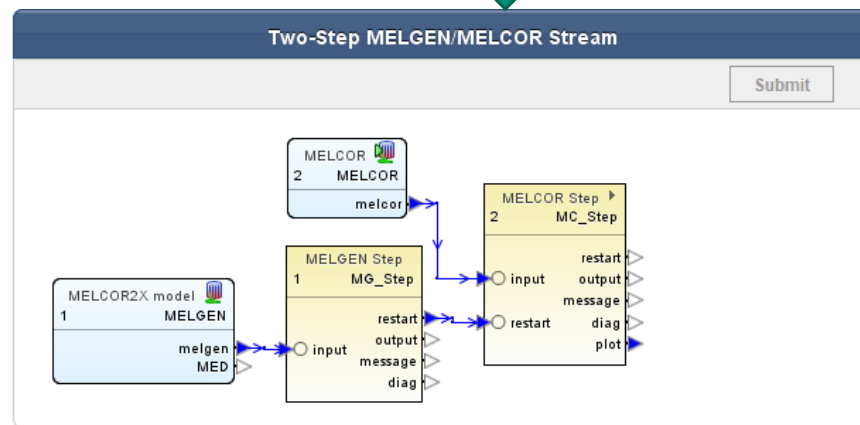
📄 A Single Step MELGEN Stream  
A job stream containing a single model node connected to a MELGEN job step.

📄 A Single Step MELCOR Stream  
A job stream containing a MELCOR job step and an AptPlot step. This stream uses an External File to reference the restart file from a previously completed MELGEN or MELCOR job.

📄 A Two-Step MELGEN/MELCOR Stream  
A job stream containing a MELGEN, a MELCOR, and an AptPlot step. This stream runs the full model with MELGEN then runs MELCOR with the resulting restart file.

Create new a view for this Job Stream.

◀ Back Next ▶ Finish Cancel

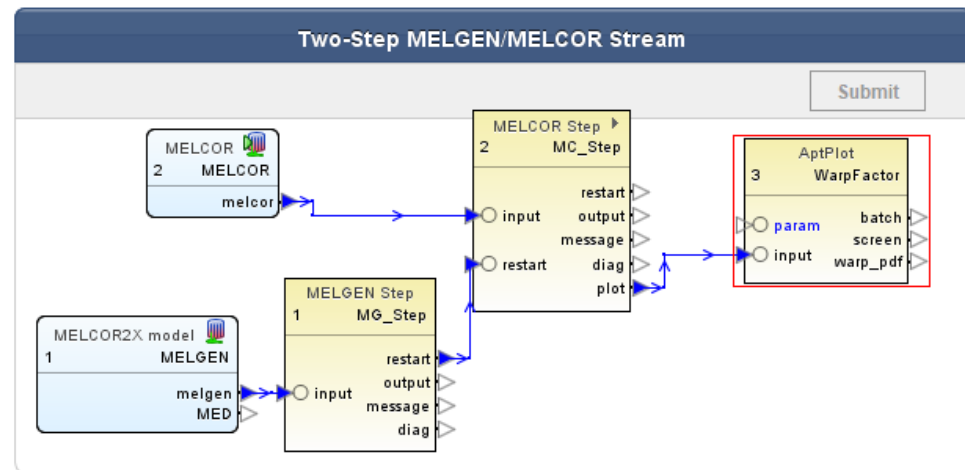
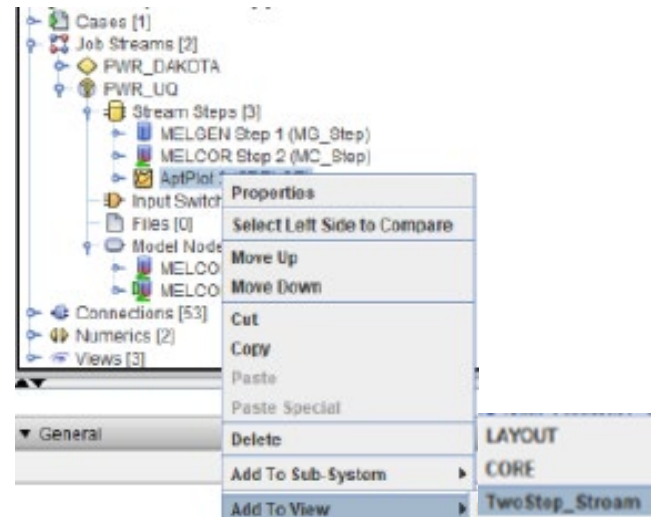


# Performing a Sensitivity Study with SNAP

## Step 4 –Dakota Run Stream (3) – Add AptPlot to view



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job





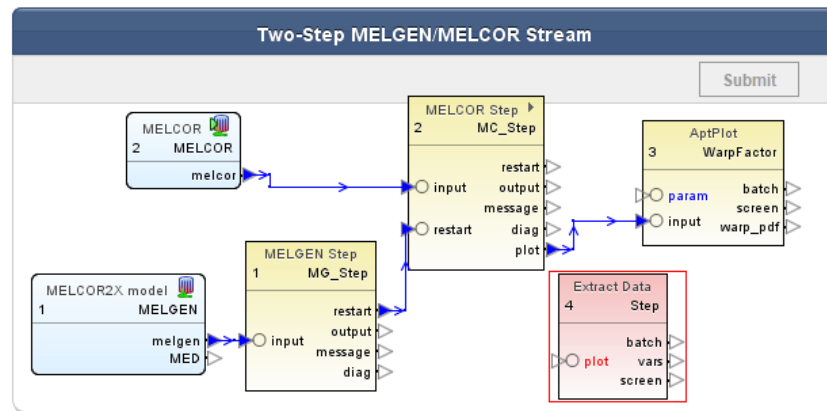
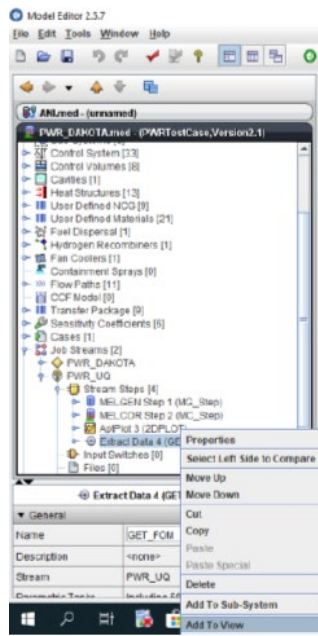
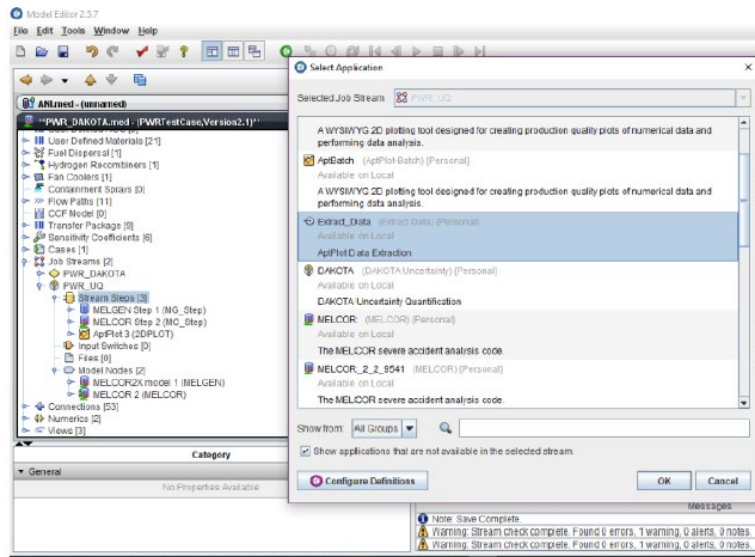
# Performing a Sensitivity Study with SNAP

11

## Step 4 –Dakota Run Stream (4) – Add Extract Data

1. Select Dakota plugin during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

### Add Extract Data to Job Stream

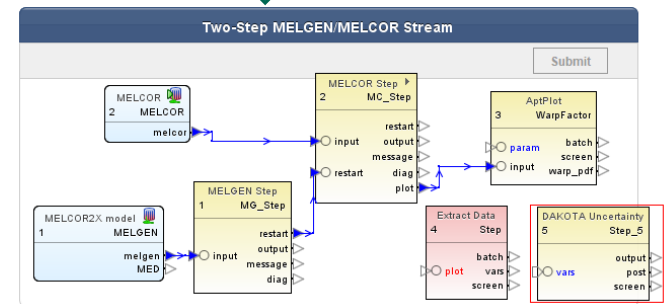
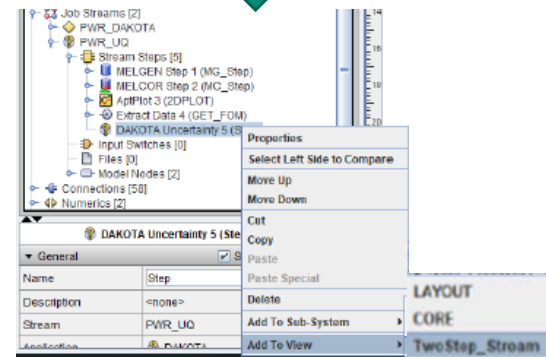
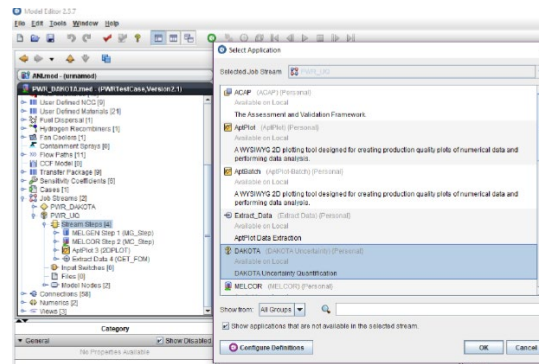


# Performing a Sensitivity Study with SNAP

## Step 4 –Dakota Run Stream (4) – Add DAKOTA to Job Stream



1. Select Dakota plugin during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

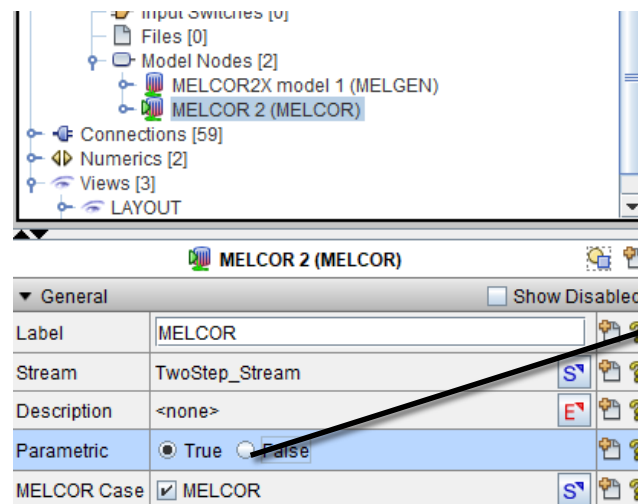
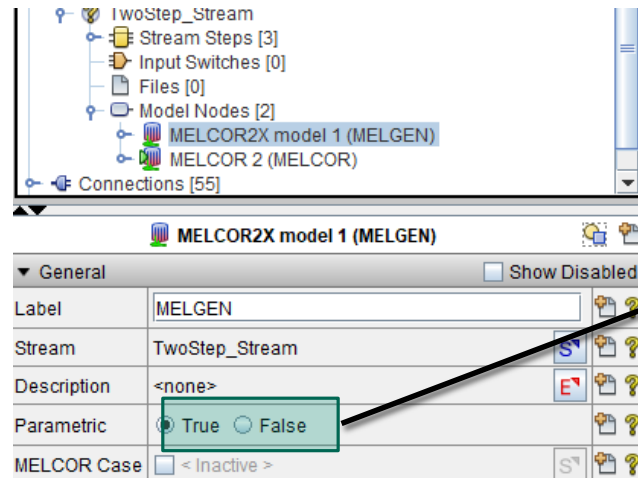


# Performing a Sensitivity Study with SNAP

## Step 5 – Parametric Model Node



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job



# Performing a Sensitivity Study with SNAP

## Step 6 – Parametric Properties (I)



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

The screenshot displays the SNAP software interface. On the left, a tree view shows the project structure with 'TwoStep\_Stream' selected under 'Job Streams [1]'. On the right, the 'DAKOTA Properties' dialog box is open, showing the following settings:

- Number of Samples: 59
- Random Seed: -auto-
- Sampling Method: Monte-Carlo (selected), Latin Hypercube
- Input Error Handling: Ignore model check errors
- Figures of Merit: (empty table)
- Order: 1
- Probability: 95.0
- Confidence: 95.0
- Replacement Factor: 0.5
- Time Dependent: (unchecked)

Below the dialog box, the 'TwoStep\_Stream' node is expanded in the 'General' tab, showing the following properties:

Property	Value
Name	TwoStep_Stream
Description	<none>
Stream Type	DAKOTA Uncertainty
Parametric Properties	59 Monte-Carlo samples, 1 respons...
File Groups	0 Groups
Platform	Local

An arrow points from the 'Parametric Properties' field in the 'TwoStep\_Stream' node to the 'DAKOTA Properties' dialog box, indicating the link between the node's configuration and the dialog's settings.

# Performing a Sensitivity Study with SNAP

## Step 6 – Parametric Properties (2) – Figures of Merit



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

DAKOTA Properties Variables Distributions Report

Number of Samples: 59

Random Seed:  -auto-

Sampling Method:  Monte-Carlo  Latin Hypercube

Input Error Handling: Ignore model check errors

Figures of Merit:

Order:  1

Probability: 95.0

Confidence: 95.0

Replacement Factor: 0.5

Time Dependent:  indent >

Name	Lower Limit	Upper Limit	Description
H2Mass	<input type="checkbox"/>	<input type="checkbox"/>	<unset>

At this point we have added an FOM, given it a name, limits, and description, but have not connected it to the database

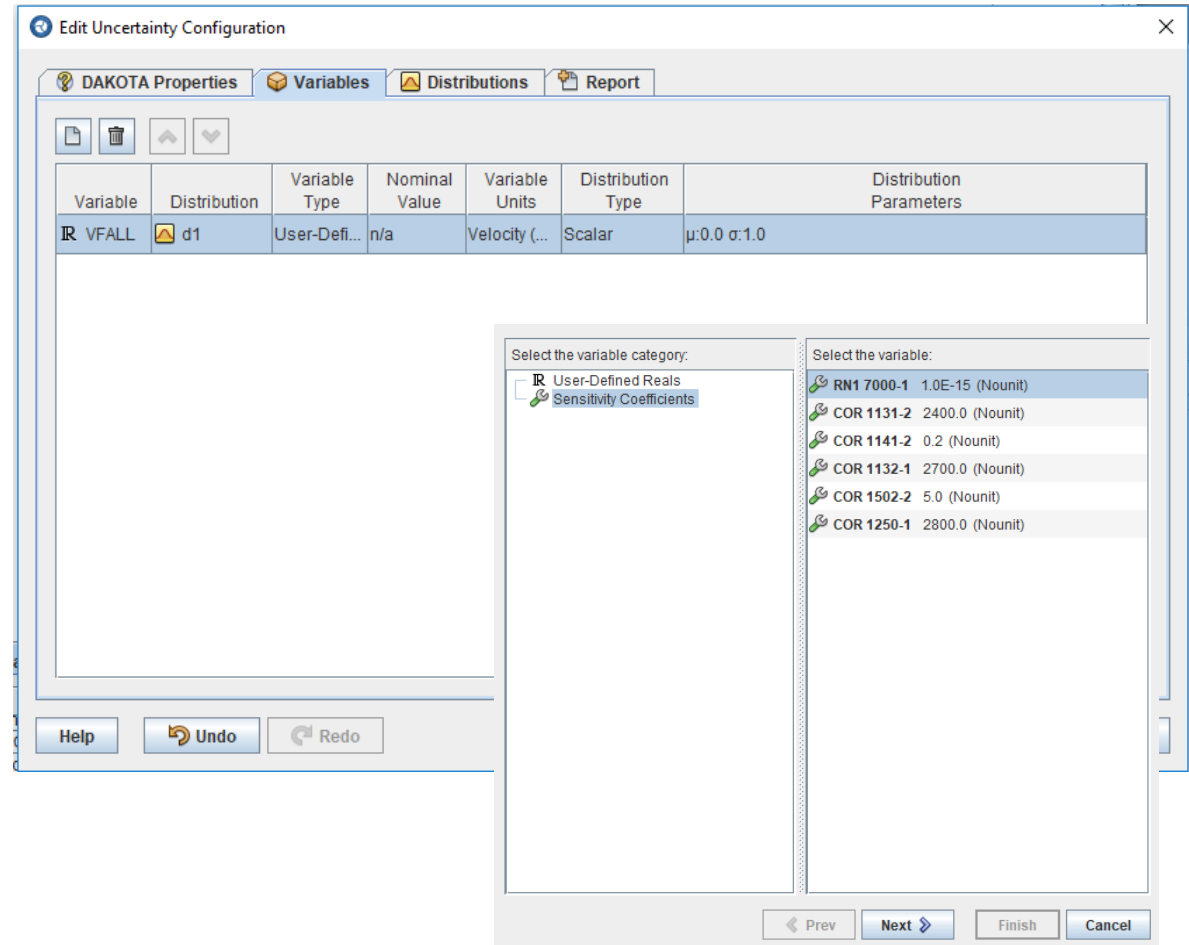
Help Undo Redo OK Cancel

# Performing a Sensitivity Study with SNAP

## Step 6 – Parametric Properties (3) – Sensitivity Variables



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job





# Performing a Sensitivity Study with SNAP

## Step 6 – Parametric Properties (4) - Distributions



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

The screenshot shows the 'DAKOTA Properties' dialog box with the 'Distributions' tab selected. The variable 'd1' is listed in the left pane. The main area shows the following configuration:

- Name: d1
- Distribution: Normal
- Rule: Scalar
- Distribution Parameters:
  - $\mu$  (Mean): 1.0 (-) ?
  - $\sigma$  (STDV): 0.05 (-) ?
  - Variance: 2.5E-3 (-) ?
  - Min: 0.0 (-) ?
  - Max: 3.0 (-) ?

On the right, there are two plots: 'Probability density' showing a normal distribution curve peaking at 7.98, and 'Cumulative distribution' showing an S-shaped curve. Both plots have x-axis labels at 0.850, 1.00, and 1.15.

### Available Distributions:

Normal	Triangular	Gumbel
Lognormal	Exponential	Frechet
Uniform	Beta	Weibull
Loguniform	Gamma	Histogram

# Performing a Sensitivity Study with SNAP

## Step 6 – Parametric Properties (5) – Report Options



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

The screenshot shows the 'Report' tab of the 'DAKOTA Properties' dialog. The 'Plotted Values' section contains a table with the following data:

Dependent	Use Independent	Independent
HDBLH	<input type="checkbox"/>	Iteration Index
VFALL	<input type="checkbox"/>	Iteration Index
TZMX	<input type="checkbox"/>	Iteration Index
TRDFAI	<input type="checkbox"/>	Iteration Index
TKMIN	<input type="checkbox"/>	Iteration Index
H2	<input checked="" type="checkbox"/>	HDBLH
H2	<input checked="" type="checkbox"/>	VFALL
H2	<input checked="" type="checkbox"/>	TZMX
H2	<input checked="" type="checkbox"/>	TRDFAI
H2	<input checked="" type="checkbox"/>	TKMIN

The inset plot shows a scatter plot of H2 (y-axis, 340 to 420) versus TZMX (COR 1131-2 -) (x-axis, 2390 to 2410). The data points show a general downward trend, with H2 values decreasing as TZMX values increase.

# Performing a Sensitivity Study with SNAP

## Step 7 – Coordinate Data Flow (Extract Data 2)



1. Select Dakota plugin during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

The screenshot displays the Model Editor 2.3.7 interface. The main window shows a tree view of the model structure, with the 'Extract Data 4 (Step)' node selected. The 'Properties View' for this step is open, showing the following configuration:

- Name: Step
- Description: -none-
- Stream: PWR\_UQ
- Application: Extract\_Data
- Relative Location: (empty)
- View in Job Status:  Yes  No
- Keywords: No Keywords
- Conditional Logic: None
- Input Files: [1] Required Files Missing
- Output Files: [4] Outputs Defined
- Custom Processing: None
- Plot File Type: COBRA
- Plot File Data: COBRA
- AppPlot Script: EXTDATA
- Parametric Tasks: MELCOR

Below the Properties View, the 'Define Input Files For Extract Data 4 (Step)' dialog is open, showing a table of input files:

Name	Input Label	Index (cont)	File Type	Source	Runtime File Name	Delete After Completion
plot			MELCOR2X.PTF	Disconnected	melcor.plt	<input type="checkbox"/>

The 'Select Input Source' dialog is also open, showing a table of available sources:

Source	Name
MELGEN Step 1 (MC_Step)	plot
MELCOR Step 2 (MC_Step)	plot

The 'Create File' button is highlighted in the 'Select Input Source' dialog.

# Performing a Sensitivity Study with SNAP

## Step 7– Configure AptPlot output



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

**Edit Plot Outputs - AptPlot 3 (Step)**

**Hydrogen (pdf)**

General  Show Disabled

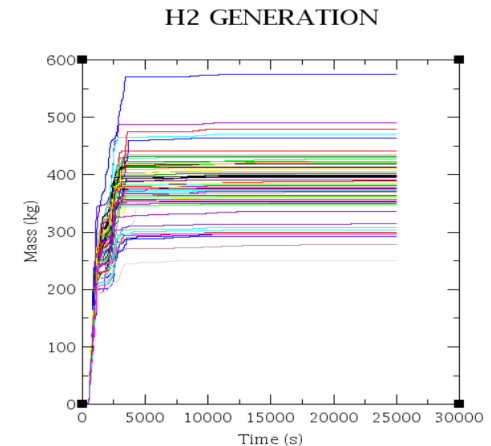
Name	Hydrogen	?
Type	PDF	?
Show Connection	<input checked="" type="radio"/> True <input type="radio"/> False	?
Plot	p0: plot1	E? ?
Output File	[1] Output Defined	E? ?

Close

User can add multiple outputs, i.e., PDF, ASCII

Note: Exporting MELCOR deck to file input.gen  
 Note: Saving C:\Users\vlhumph\snapp2.0\temp\Model.med, please wait...  
 Note: Saving model documents. Please wait...  
 Note: Save Complete.  
 Note: Stream submitted with batch ID /Test/MELCOR/TwoStep\_Stream.  
 Alert: Reloading site configuration settings.

Write horsetail plots to PDF file



# Performing a Sensitivity Study with SNAP

## Step 7– Configure AptPlot output



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

The screenshot displays the configuration of an AptPlot step in the SNAP software. The central configuration table is as follows:

AptPlot 3 (Step)	
Application	AptPlot
Relative Location	
View in Job Status	<input type="radio"/> Yes <input checked="" type="radio"/> No
Keywords	No Keywords
Conditional Logic	None
Custom Processing	None
Plot Inputs	[1] input definition
Plots	[1] plot
Plot Outputs	[1] output definition
Parameter File	<inactive>

The property window on the right shows the following settings:

- Name: unnamed
- Input: input
- Input Filter: [0]
- Plot Type: Time
- Dependent Data: CFVALU\_9001
- Dependent Type: Channel
- Units: SI
- X Slope Factor: 1.0 (-)
- X Shift:  2.777778E-4 (-)
- Y Slope Factor: 1.0 (-)
- Y Shift: 0.0 (-)
- Legend Entry: <Inactive>

Annotations in the image indicate:

- "Enter MELCOR Plot Variable" points to the Dependent Data field.
- "Scale X axis for units in hrs" points to the X Shift field.

The status bar at the bottom contains the following messages:

- Note: Exporting MELCOR deck to file input.gen
- Note: Saving C:\Users\lhumph\snap2.0\tmp\Model.med, please wait...
- Note: Saving model documents. Please wait...
- Note: Save Complete.
- Note: Stream submitted with batch ID /Test/MELCOR/TwoStep\_Stream.
- Alert: Reloading site configuration settings.

# Performing a Sensitivity Study with SNAP

## Step 7 – Coordinate Data Flow (Pipe Plot Data)



1. Select Dakota plugin during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

The screenshot displays the Model Editor 2.3.7 interface. The main window shows a tree view of the model structure, with the 'Extract Data 4 (Step)' node selected under the 'PWR\_DAKOTA' stream. The 'Properties View' for this step is open, showing the following details:

General	
Name	Step
Description	<none>
Stream	PWR_UQ
Parametric Tasks	Including 59 of 59
Application	Extract_Data
Relative Location	
Keywords	No Keywords
Conditional Logic	None
Input Files	[1] Inputs Defined
Output Files	[4] Outputs Defined
Custom Processing	None
Plot File Type	MELCOR
Plot File Data	<input type="radio"/> Demux <input checked="" type="radio"/> Standard Plot

The 'Edit AptPlot Script' dialog is open, showing the following script content:

```

Enter AptPlot commands to extract data into the indicated variables:

MELCOR PTF "4(PlotFile)"
CALC "M2_GEN = 0.0"
CALC "M_GEN = getIVal(24000.0, MD_(COR-DMZ-TOI))"

SAVEVAR "M_GEN"
WRITEVAR ASCII "4(VariableFile)"
EXIT
  
```

The line `CALC "M_GEN = getIVal(24000.0, MD_(COR-DMZ-TOI))"` is highlighted in red in the original image. The 'OK' and 'Cancel' buttons are visible at the bottom of the dialog.

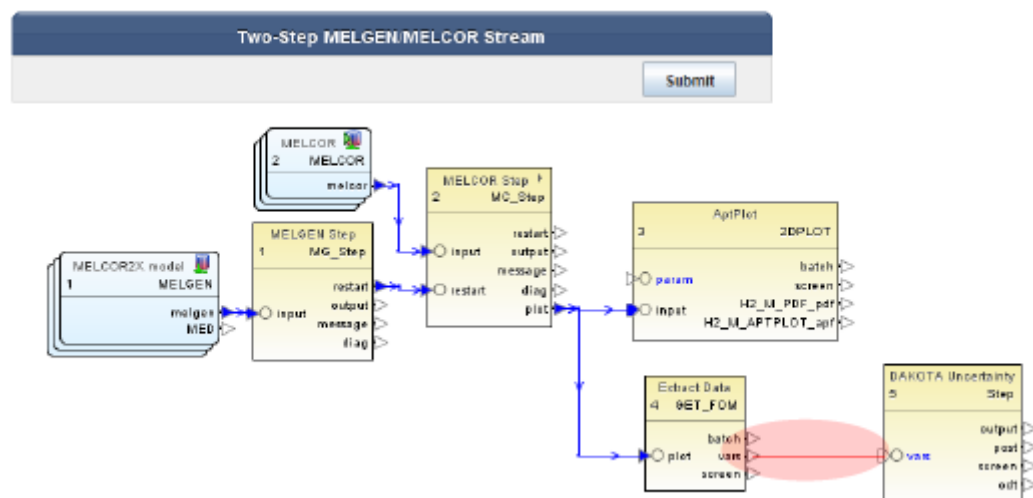
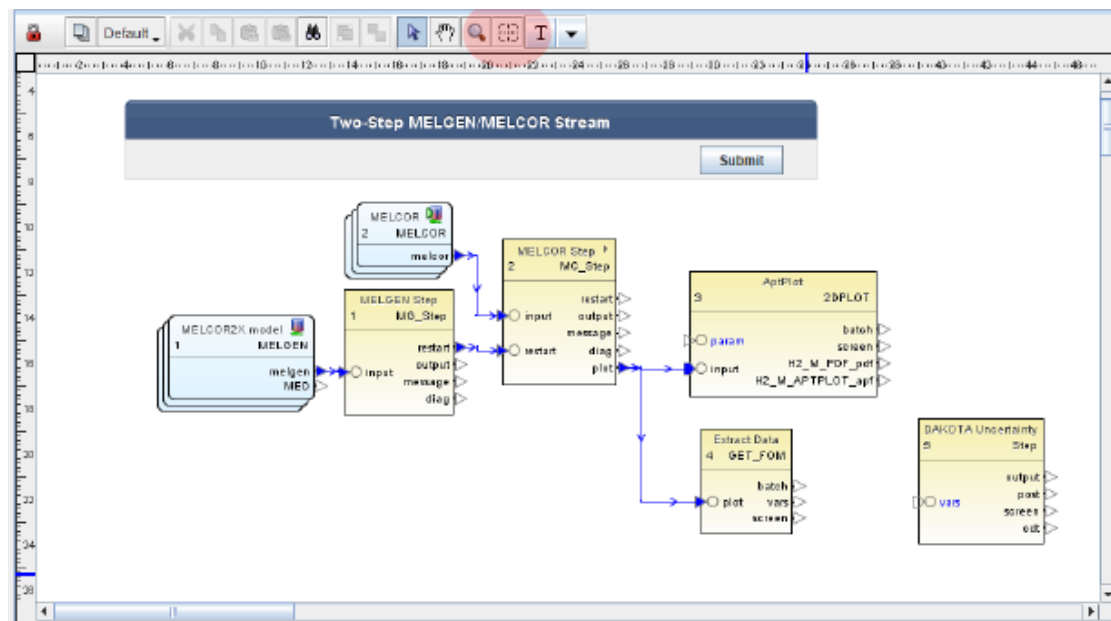
# Performing a Sensitivity Study with SNAP

## Step 7 – Coordinate Data Flow (Connect 'Extract Data' output to Dakota input)

23



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job

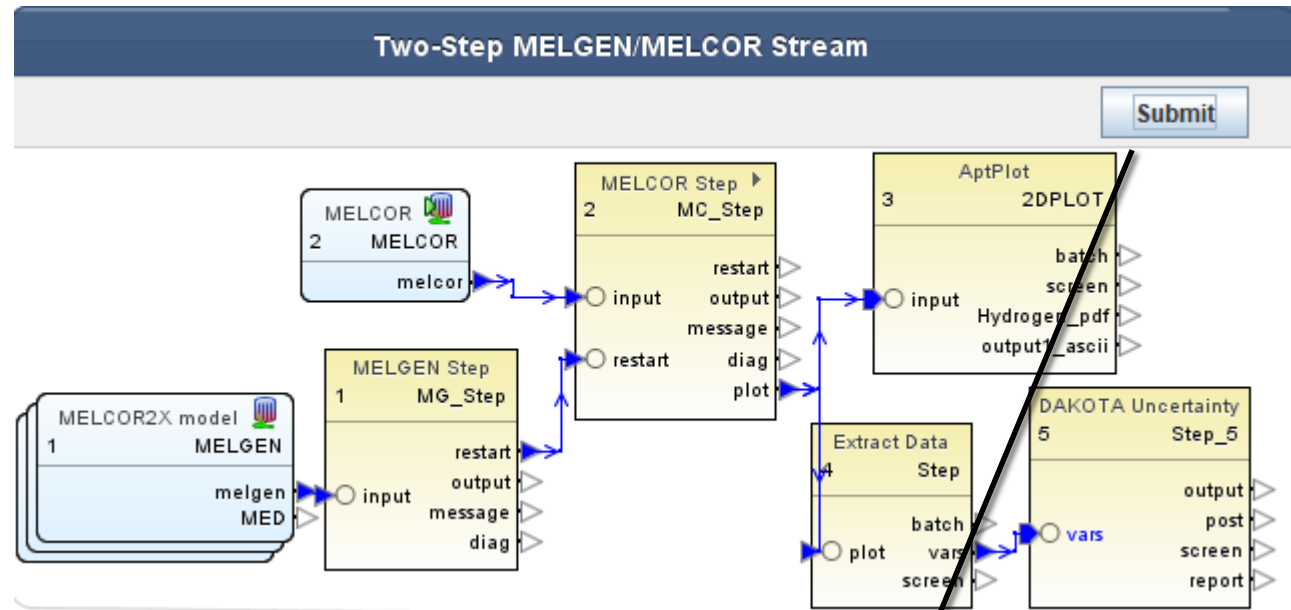


# Performing a Sensitivity Study with SNAP

## Step 7 – Run Dakota Job Stream



1. Select Dakota plug-in during the SNAP plugins download and installation step
2. Create a Numeric value in your model
3. Assign the Numeric value as an input value
4. Create a Dakota Run Stream
5. Specify a model node as parametric (MELGEN or MELCOR depending on input)
6. Define Dakota parametric properties
7. Coordinate data flow
8. Run Job



File View Tools Help

Job List MC\_Step\_T01

calcserv://Local/Test/MELCOR/TwoStep\_Stream/

Job	Priority	Job Type	Status	Submitted	Started	Comple...	Calc Time	Loaded	...
MC_Step_T01	5	MELCOR	Complete	12:43:22	12:43:50	12:52:45	No Data	No	
MC_Step_T02	5	MELCOR	Complete	12:43:27	12:43:50	12:52:55	No Data	No	
MC_Step_T03	5	MELCOR	Complete	12:43:27	12:43:50	12:53:29	No Data	No	
MC_Step_T04	5	MELCOR	Complete	12:43:32	12:43:51	12:53:34	No Data	No	
MC_Step_T05	5	MELCOR	Complete	12:43:27	12:43:50	12:52:43	No Data	No	
MC_Step_T06	5	MELCOR	Complete	12:43:32	12:43:51	12:52:55	No Data	No	
MC_Step_T07	5	MELCOR	Complete	12:43:27	12:43:50	12:52:55	No Data	No	
MC_Step_T08	5	MELCOR	Complete	12:43:27	12:43:50	12:53:03	No Data	No	
MC_Step_T09	5	MELCOR	Complete	12:43:27	12:43:51	12:52:52	No Data	No	
MC_Step_T10	5	MELCOR	Complete	12:43:27	12:43:51	12:53:15	No Data	No	
MC_Step_T11	5	MELCOR	Complete	12:43:32	12:43:52	12:52:58	No Data	No	
MC_Step_T12	5	MELCOR	Complete	12:43:27	12:43:51	12:53:03	No Data	No	
MC_Step_T13	5	MELCOR	Complete	12:43:32	12:43:52	12:53:22	No Data	No	
MC_Step_T14	5	MELCOR	Complete	12:43:32	12:43:54	12:52:58	No Data	No	
MC_Step_T15	5	MELCOR	Complete	12:43:28	12:43:51	12:52:53	No Data	No	
MC_Step_T16	5	MELCOR	Complete	12:43:32	12:43:54	12:53:00	No Data	No	
MC_Step_T17	5	MELCOR	Complete	12:43:28	12:43:51	12:53:07	No Data	No	
MC_Step_T18	5	MELCOR	Complete	12:43:33	12:43:55	12:52:42	No Data	No	
MC_Step_T19	5	MELCOR	Complete	12:43:33	12:43:56	12:52:44	No Data	No	





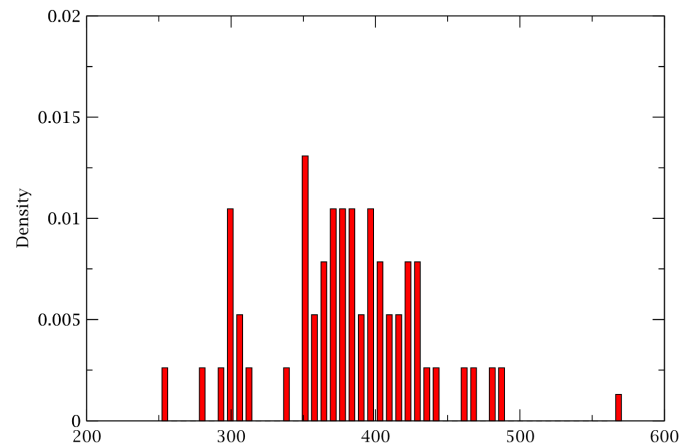
Statistical results based on 59 samples:

Summary	Value	Task #
Min Value	250.87505	54
Max Value	574.76666	51
Mean	381.43805	-
Median	382.44507	40
Standard Deviation	56.8461	-
Coefficient of Variance	0.38578	-

Response Correlations

	Simple	Partial	Simple Rank	Partial Rank
d5	0.0979063	0.102384	0.135067	0.268539
d6	0.110172	0.146704	0.0338983	0.0599765
d7	0.098521	0.123725	0.126768	0.209831
d1	0.737284	0.791904	0.765926	0.855157
d2	-0.495872	-0.627241	-0.379486	-0.653184
d3	0.03035	0.00594472	0.0189947	0.0516358
d4	-0.0188159	0.0125986	-0.0151373	0.0108442

Probability Density Function



H2 GENERATION

