Report on Components

Generated by MTT using :
(mtt -u -q -q Components rep pdf)

Tue Aug 19 14:45:34 BST 2003

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Components

Chapter 1

OnePorts

1.1 OnePorts_abg.tex

MTT command:

```
mtt OnePorts abg tex
```

The acausal bond graph of system **OnePorts** is displayed in Figure 1.1 (on page 10); it contains the one port components: **R**, **C** and **I** in each of the two possible causalities.

Note that the **R** has no prefered causality and, in this case, a causal stroke must be provided by the user. On the other hand, the **C** and **I** components are assigned prefered causality by MTT in the 3rd and 5th cases where no stroke is assigned by ther user. In the 4th and 6th cases, the user provides a causal stroke to put the components into derivative causality. 1.2 (on page 13) shows the causality automatically completed for the 3rd and 5th cases.

Section 1.5 (on page 15) gives the system equations, y_1 to y_6 are the outputs (with the given causality) of the 6 components and u_1 to u_6 are the coresponding inputs. x_1 and x_2 are the states of the 3rd and 5th cases (ie integrated flow and effort respectively), z_1 and z_2 are the corresponding quantities for the the 4th and 6th cases, the two components in derivative causality.

1.1.1 Summary information

System OnePorts: Detailed description here

Interface information:

Parameter $1 represents actual parameter **c_3**

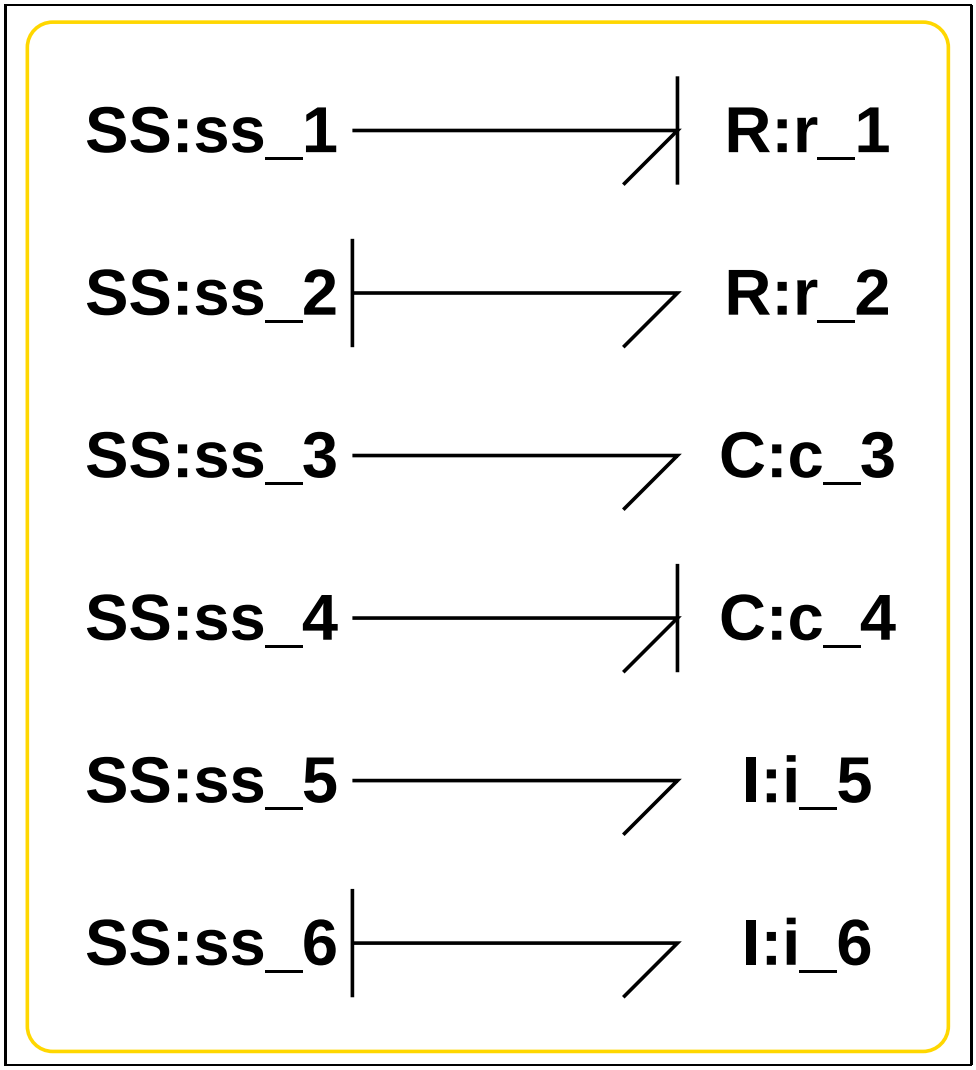

Figure 1.1: System **OnePorts**: acausal bond graph

Parameter $2 represents actual parameter **c_4**

Parameter $3 represents actual parameter **i_5**

Parameter $4 represents actual parameter **i_6**

Parameter $5 represents actual parameter **r_1**

Parameter $6 represents actual parameter **r_2**

Variable declarations:

This component has no PAR declarations

Units declarations:

This component has no UNITs declarations

The label file: OnePorts_lbl.txt

```
#SUMMARY OnePorts
#DESCRIPTION Detailed description here

## System OnePorts, representation lbl, language txt
## File OnePorts_lbl.txt
## Generated by MTT on Tue Aug 19 14:45:14 BST 2003

  ########################################
  ##### Model Transformation Tools #####
  ########################################

  ############################################################
  ## Version control history
  ############################################################
  ## $Id: mtt_banner.sh,v 1.2 2001/07/03 22:59:10 gawthrop Exp $
  ## $Log: mtt_banner.sh,v $
  ## Revision 1.2  2001/07/03 22:59:10  gawthrop
  ## Fixed problems with argument passing for CRs
  ##
  ############################################################

## Port aliases
```

```
## Argument aliases
#ALIAS $1 c_3
#ALIAS $2 c_4
#ALIAS $3 i_5
#ALIAS $4 i_6
#ALIAS $5 r_1
#ALIAS $6 r_2

## Each line should be of one of the following forms:
##      a comment (ie starting with #)
##      component-name cr_name arg1,arg2,..argn
##      blank

## ---- Component labels ----

## Component type C
c_3 lin effort,c_3
c_4 lin effort,c_4

## Component type I
i_5 lin flow,i_5
i_6 lin flow,i_6

## Component type R
r_1 lin flow,r_1
r_2 lin flow,r_2

## Component type SS
ss_1 SS external,external
ss_2 SS external,external
ss_3 SS external,external
ss_4 SS external,external
ss_5 SS external,external
ss_6 SS external,external
```

1.1.2 Subsystems

No subsystems.

1.2 OnePorts_cbg.ps

MTT command:

```
mtt OnePorts cbg ps
```

This representation is given as Figure 1.2 (on page 13).

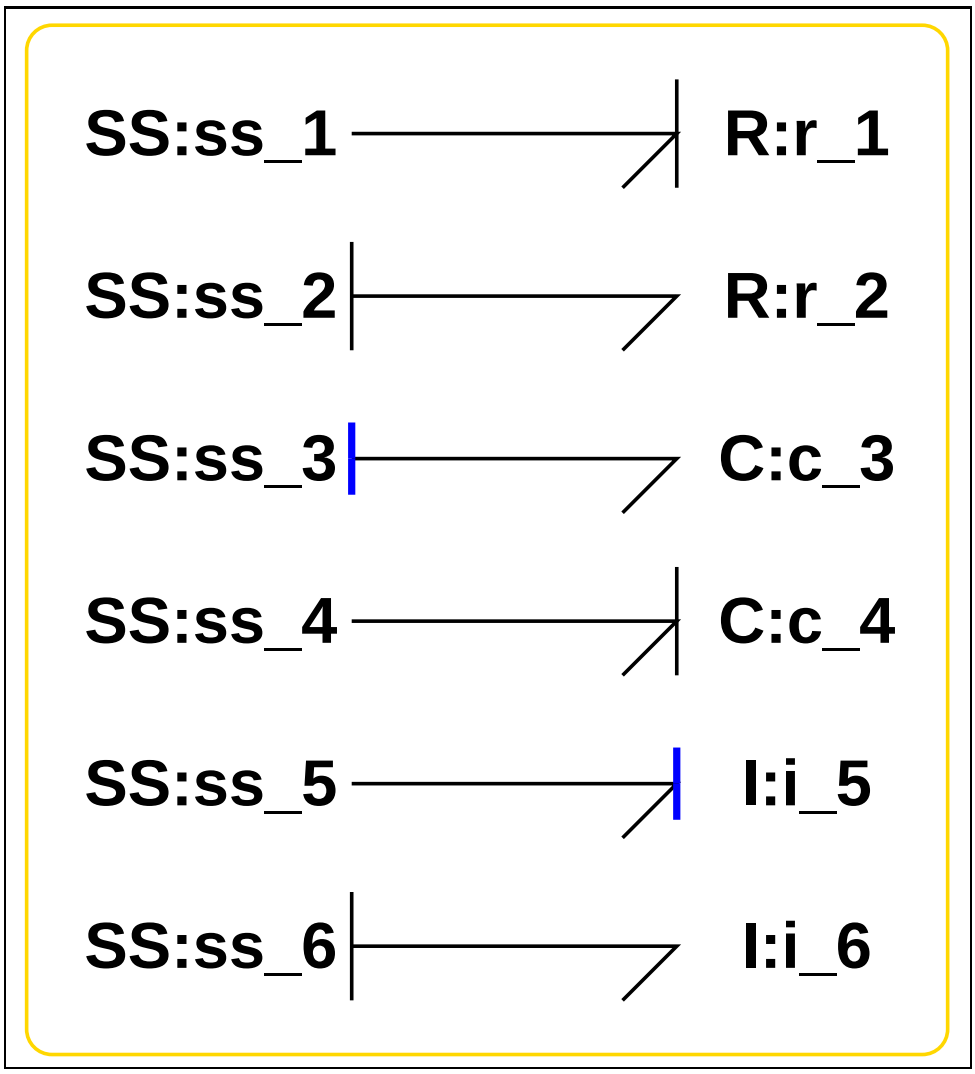

Figure 1.2: System **OnePorts**, representation cbg (-noargs)

1.3 OnePorts_struc.tex

MTT command:

```
mtt OnePorts struc tex
```

List of inputs for system OnePorts			
	Component	System	Repetition
1	ss_1	OnePorts__ss_1	1
2	ss_2	OnePorts__ss_2	1
3	ss_3	OnePorts__ss_3	1
4	ss_4	OnePorts__ss_4	1
5	ss_5	OnePorts__ss_5	1
6	ss_6	OnePorts__ss_6	1

List of nonstates for system OnePorts			
	Component	System	Repetition
1	c_4	OnePorts__c_4	1
2	i_6	OnePorts__i_6	1

List of outputs for system OnePorts			
	Component	System	Repetition
1	ss_1	OnePorts__ss_1	1
2	ss_2	OnePorts__ss_2	1
3	ss_3	OnePorts__ss_3	1
4	ss_4	OnePorts__ss_4	1
5	ss_5	OnePorts__ss_5	1
6	ss_6	OnePorts__ss_6	1

List of states for system OnePorts			
	Component	System	Repetition
1	c_3	OnePorts__c_3	1
2	i_5	OnePorts__i_5	1

1.4 OnePorts_sympar.tex

MTT command:

```
mtt OnePorts sympar tex
```

Parameter	System
c_3	OnePorts
c_4	OnePorts
i_5	OnePorts
i_6	OnePorts
r_1	OnePorts
r_2	OnePorts

Table 1.1: Parameters

1.5 OnePorts_ode.tex

MTT command:

```
mtt OnePorts ode tex
```

$$\begin{aligned} \dot{x}_1 &= u_3 \\ \dot{x}_2 &= u_5 \end{aligned} \tag{1.1}$$

$$\begin{aligned} y_1 &= \frac{u_1}{r_1} \\ y_2 &= u_2 r_2 \\ y_3 &= \frac{x_1}{c_3} \\ y_4 &= c_4 \dot{u}_4 \\ y_5 &= \frac{x_2}{i_5} \\ y_6 &= i_6 \dot{u}_6 \end{aligned} \tag{1.2}$$

Chapter 2

TwoPorts

2.1 TwoPorts_abg.tex

MTT command:

```
mtt TwoPorts abg tex
```

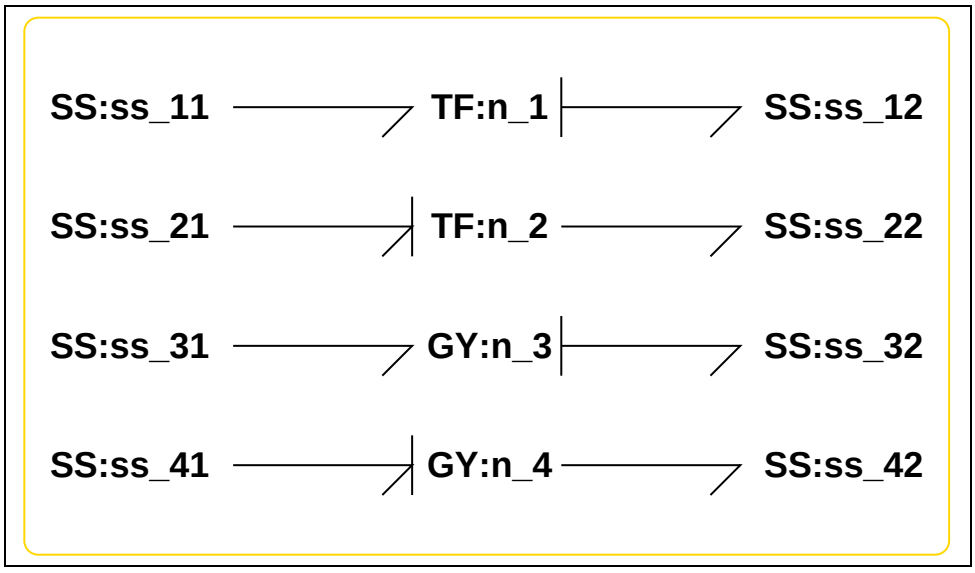

Figure 2.1: System **TwoPorts**: acausal bond graph

The acausal bond graph of system **TwoPorts** is displayed in Figure 2.1 (on page 17); it contains the two port components: **TF** and **GY** in each of the two possible causalities.

Note that the neither component has prefered causality and, in both cases, a causal stroke must be provided by the user.
Section 2.5 (on page 22) gives the system equations.

2.1.1 Summary information

System TwoPorts: Detailed description here

Interface information:

Parameter $1 represents actual parameter **n_1**

Parameter $2 represents actual parameter **n_2**

Parameter $3 represents actual parameter **n_3**

Parameter $4 represents actual parameter **n_4**

Variable declarations:

This component has no PAR declarations

Units declarations:

This component has no UNITs declarations

The label file: TwoPorts_lbl.txt

```
#SUMMARY TwoPorts
#DESCRIPTION Detailed description here

## System TwoPorts, representation lbl, language txt
## File TwoPorts_lbl.txt
## Generated by MTT on Tue Aug 19 14:45:25 BST 2003

  ########################################
  ##### Model Transformation Tools #####
  ########################################

  ############################################################
  ## Version control history
  ############################################################
```

```
  ## $Id: mtt_banner.sh,v 1.2 2001/07/03 22:59:10 gawthrop Exp $
  ## $Log: mtt_banner.sh,v $
  ## Revision 1.2  2001/07/03 22:59:10  gawthrop
  ## Fixed problems with argument passing for CRs
  ##
  ################################################################

## Port aliases

## Argument aliases
#ALIAS $1 n_1
#ALIAS $2 n_2
#ALIAS $3 n_3
#ALIAS $4 n_4

## Each line should be of one of the following forms:
##      a comment (ie starting with #)
##      component-name cr_name arg1,arg2,..argn
##      blank

## ---- Component labels ----

## Component type GY
n_3 lin flow,n_3
n_4 lin flow,n_4

## Component type SS
ss_11 SS external,external
ss_12 SS external,external
ss_21 SS external,external
ss_22 SS external,external
ss_31 SS external,external
ss_32 SS external,external
ss_41 SS external,external
ss_42 SS external,external

## Component type TF
n_1 lin flow,n_1
n_2 lin flow,n_2
```

2.1.2 Subsystems

No subsystems.

2.2 TwoPorts_cbg.ps

MTT command:

```
mtt TwoPorts cbg ps
```

This representation is given as Figure 2.2 (on page 20).

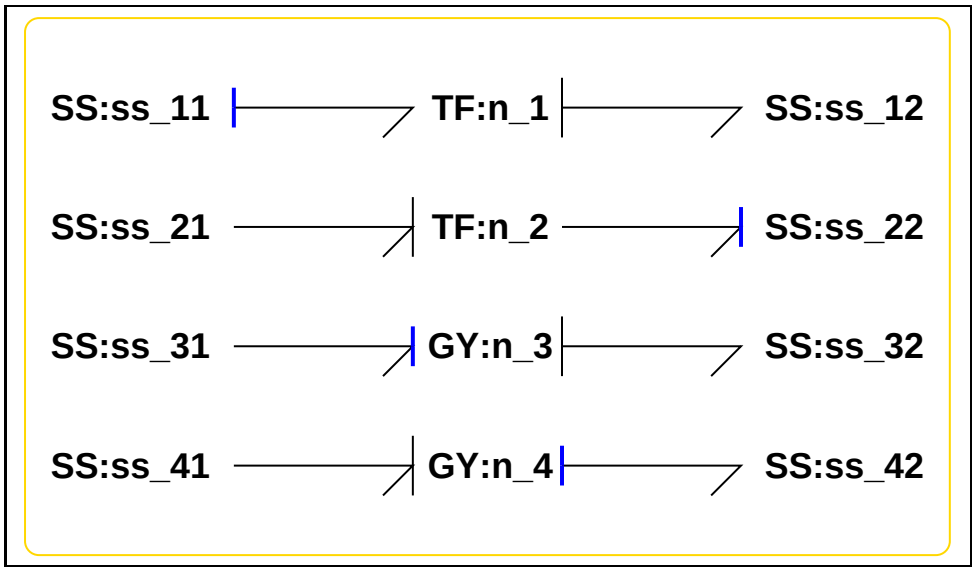

Figure 2.2: System **TwoPorts**, representation cbg (-noargs)

2.3 TwoPorts_struc.tex

MTT command:

```
mtt TwoPorts struc tex
```

List of inputs for system TwoPorts			
	Component	System	Repetition
1	ss_11	TwoPorts_ss_11	1

List of inputs for system TwoPorts (continued)			
	Component	System	Repetition
2	ss_12	TwoPorts_ss_12	1
3	ss_21	TwoPorts_ss_21	1
4	ss_22	TwoPorts_ss_22	1
5	ss_31	TwoPorts_ss_31	1
6	ss_32	TwoPorts_ss_32	1
7	ss_41	TwoPorts_ss_41	1
8	ss_42	TwoPorts_ss_42	1

List of outputs for system TwoPorts			
	Component	System	Repetition
1	ss_11	TwoPorts_ss_11	1
2	ss_12	TwoPorts_ss_12	1
3	ss_21	TwoPorts_ss_21	1
4	ss_22	TwoPorts_ss_22	1
5	ss_31	TwoPorts_ss_31	1
6	ss_32	TwoPorts_ss_32	1
7	ss_41	TwoPorts_ss_41	1
8	ss_42	TwoPorts_ss_42	1

2.4 TwoPorts_sympar.tex

MTT command:

```
mtt TwoPorts sympar tex
```

Parameter	System
n_1	TwoPorts
n_2	TwoPorts
n_3	TwoPorts
n_4	TwoPorts

Table 2.1: Parameters

2.5 TwoPorts_ode.tex

MTT command:

```
mtt TwoPorts ode tex
```

$$
\begin{aligned}
y_1 &= u_2 n_1 \\
y_2 &= u_1 n_1 \\
y_3 &= \frac{u_4}{n_2} \\
y_4 &= \frac{u_3}{n_2} \\
y_5 &= \frac{u_6}{n_3} \\
y_6 &= \frac{u_5}{n_3} \\
y_7 &= \frac{u_8}{n_4} \\
y_8 &= \frac{u_7}{n_4}
\end{aligned}
\tag{2.1}
$$

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