

1 Variables

2 root

	var	symbol	documentation	type	units	tokens	eqs
13	$F_{N,A}$	F	directed graph incidence matrix	network		[]	
1	t_N	t	time	frame	s	[]	
3	t_N^o	to	starting time	frame	s	[]	1
4	t_N^e	te	end time	frame	s	[]	2
2	$\#$	value	numerical value	constant		[]	
18	0	null	numerical value 0	constant		[]	16
19	1	one	numerical value 1	constant		[]	17

3 System

	var	symbol	documentation	type	units	tokens	eqs
28	$\hat{x}^{A,\alpha}_A$	fx_A_alpha	flow of A mechanism alpha	transport	ms^{-1}	[]	28
29	$\hat{x}^{A,\beta}_A$	fx_A_beta	flow of A mechanism beta	transport	ms^{-1}	[]	29
32	$\hat{y}^{B,\gamma}_A$	fy_B_gamma	flow of B mechanism gamma	transport	s^{-1}	[]	31
35	$\hat{y}^{B,\delta}_A$	fy_B_delta	flow of B mechanism delta	transport	s^{-1}	[]	34
5	x_N	x	state token A	state	m	[]	38
11	$\pi^{A,\alpha}_N$	pi_A_alpha	effort A mechanism alpha	state	m	[]	7 14
12	$\pi^{A,\beta}_N$	pi_A_beta	effort A mechanism beta	state	m	[]	8 15
16	\dot{x}_N	dx	differential state	state	ms^{-1}	[]	18 37
17	x_N^o	xo	initial condition for token A	state	m	[]	12
20	$\underline{\pi}^A_N$	pi_A_stack	the stack of intensive variables token A	state	m	[]	19

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	var	symbol	documentation	type	units	tokens	eqs
21	y_N	y	state token B	state	s^{-1}	[]	39
24	$\pi^{B,\gamma}_N$	pi_B_gamma	effort B mechanism gamma	state		[]	23
26	\dot{y}_N	dy	differential state for token B	state		[]	35 36
27	y^o_N	yo	initial condition for token B	state		[]	26
33	$\pi^{B,\delta}_N$	pi_B_delta	effort B mechansim delta	state		[]	32
36	$\underline{\pi}^B_N$	pi_B_stack	the stack of intensive variables token B	state	s^{-1}	[]	44
7	$K^{A,\alpha}_N$	K_A_alpha	frequency token A	constant		[]	40
8	$K^{A,\beta}_N$	K_A_beta	frequency token B	constant		[]	41
9	$M^{A,\alpha}$	M_A_alpha	norming factor token A mechanism alpha	constant		[]	42
10	$M^{A,\beta}$	M_A_beta	norming factor token A mechanism beta	constant		[]	43
22	$M^{B,\gamma}$	M_B_gamma	norming factor token B mechanism gamma	constant	s^{-1}	[]	
23	$K^{B,\gamma}_N$	K_B_gamma	norming factor token A mechanism d	constant		[]	22
30	$K^{B,\delta}_N$	K_B_delta	frequency B delta	constant		[]	30
31	$M^{B,\delta}$	M_B_delta	norming factor token B mechanism delta	constant		[]	

4 Properties

	var	symbol	documentation	type	units	tokens	eqs
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5 Control

	var	symbol	documentation	type	units	tokens	eqs
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6 System-Properties

	var	symbol	documentation	type	units	tokens	eqs
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7 Properties–System

	var	symbol	documentation	type	units	tokens	eqs
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8 System–Control

	var	symbol	documentation	type	units	tokens	eqs
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9 Control–System

	var	symbol	documentation	type	units	tokens	eqs
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10 Properties–Control

	var	symbol	documentation	type	units	tokens	eqs
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11 Control–Properties

	var	symbol	documentation	type	units	tokens	eqs
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12 Equations

12.1 Model equations

no	equation	documentation	layer
1	$t_N^o := Set(t_N, \#)$	starting time	root
2	$t_N^e := Set(t_N, \#)$	end time	root
7	$\pi^{A,\alpha}_N := M^{A,\alpha} . x_N$	effort a	System
8	$\pi^{A,\beta}_N := M^{A,\beta} . x_N$	effort b	System
12	$x_N^o := Set(x_N, \#)$	initial condition	System
14	$\pi^{A,\alpha}_N := Set(\pi^{A,\alpha}_N, \#)$	effort a	System
15	$\pi^{A,\beta}_N := Set(\pi^{A,\beta}_N, \#)$	effort b	System
16	$0 := Set(\#, \#)$	numerical value 0	root
17	$1 := Set(\#, \#)$	numerical value 1	root
18	$\dot{x}_N := Set(\dot{x}_N, 0)$	differential state	System
19	$\underline{\pi}^A_N := Stack(\pi^{A,\alpha}_N, \pi^{A,\beta}_N)$	the stack of intensive variables	System
22	$K^{B,\gamma}_N := Set((t_N)^{-1}, \#)$	frequency B alpha	System
23	$\pi^{B,\gamma}_N := M^{B,\gamma} . y_N$	transport of B mechanism gamma	System
26	$y_N^o := Set(y_N, \#)$	initial condition for token B	System
28	$\hat{x}^{A,\alpha}_A := K^{A,\alpha}_N . F_{N,A} \overset{N}{\star} \pi^{A,\alpha}_N$	flow of A mechanism alpha	System
29	$\hat{x}^{A,\beta}_A := K^{A,\beta}_N . F_{N,A} \overset{N}{\star} \pi^{A,\beta}_N$	flow of A mechanism beta	System

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no	equation	documentation	layer
30	$K^{B,\delta}_N := Set((t_N)^{-1}, \#)$	var doc : frequency B delta	System
31	$\hat{y}^{B,\gamma}_A := K^{B,\gamma}_N \cdot F_{N,A} \stackrel{N}{\star} \pi^{B,\gamma}_N$	flow of B mechanism gamma	System
32	$\pi^{B,\delta}_N := M^{B,\delta} \cdot y_N$	effort B mechansim delta	System
34	$\hat{y}^{B,\delta}_A := K^{B,\delta}_N \cdot F_{N,A} \stackrel{N}{\star} \pi^{B,\delta}_N$	flow of B mechanism delta	System
35	$\dot{y}_N := F_{N,A} \stackrel{A}{\star} \hat{y}^{B,\gamma}_A + F_{N,A} \stackrel{A}{\star} \hat{y}^{B,\delta}_A$	differential state for token B	System
36	$\dot{y}_N := Set(\dot{y}_N, \#)$	differential state for token B	System
37	$\dot{x}_N := F_{N,A} \stackrel{A}{\star} \hat{x}^{A,\alpha}_A + F_{N,A} \stackrel{A}{\star} \hat{x}^{A,\beta}_A$	differential state	System
38	$x_N := \int_{t^o_N}^{t^e_N} \dot{x}_N dt_N$	state token A	System
39	$y_N := \int_{t^o_N}^{t^e_N} \dot{y}_N dt_N$	state token B	System
40	$K^{A,\alpha}_N := Set((t_N)^{-1}, \#)$	frequency token A	System
41	$K^{A,\beta}_N := Set((t_N)^{-1}, \#)$	frequency token B	System
42	$M^{A,\alpha} := Set(\#, \#)$	norming factor token A mechanism al- pha	System
43	$M^{A,\beta} := Set(\#, \#)$	norming factor token A mechanism beta	System
44	$\underline{\pi}^B_N := Stack(\pi^{B,\gamma}_N, \pi^{B,\delta}_N)$	the stack of intensive variables token B	System