

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
37	$\hat{x}^{A,\alpha}_N$	fx_A_alpha	netflow of token A due to mechanism alpha	transport	ms^{-1}	[]	50 55
38	$\hat{x}^{A,\beta}_N$	fx_A_beta	netflow of token A due to mechanism beta	transport	ms^{-1}	[]	51 56
39	$\hat{y}^{B,\gamma}_N$	fy_B_gamma	netflow of token B due to mechanism gamma	transport	s^{-1}	[]	52 57
40	$\hat{y}^{B,\delta}_N$	fy_B_delta	netflow of token B due to mechanism delta	transport	s^{-1}	[]	53 54
5	x_N	x	state token A	state	m	[]	60
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 58
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		[]	61
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	s^{-1}	[]	36 59
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		[]	44
7	$K^{A,\alpha}_N$	K_A_alpha	frequency token A	constant	s^{-1}	[]	40
8	$K^{A,\beta}_N$	K_A_beta	frequency token B	constant	s^{-1}	[]	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		[]	
23	$K^{B,\gamma}_N$	K_B_gamma	norming factor token A mechanism d	constant	s^{-1}	[]	22
30	$K^{B,\delta}_N$	K_B_delta	frequency B delta	constant	s^{-1}	[]	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	$t_N^o := \text{Instantiate}(t_N, \#)$	starting time	root
2	$t_N^e := \text{Instantiate}(t_N, \#)$	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	$x_N^o := \text{Instantiate}(x_N, \#)$	initial condition	System
14	$\pi^{A,\alpha}_N := \text{Instantiate}(\pi^{A,\alpha}_N, \#)$	effort a	System
15	$\pi^{A,\beta}_N := \text{Instantiate}(\pi^{A,\beta}_N, \#)$	effort b	System
16	$0 := \text{Instantiate}(\#, \#)$	numerical value 0	root
17	$1 := \text{Instantiate}(\#, \#)$	numerical value 1	root
18	$\dot{x}_N := \text{Instantiate}(\dot{x}_N, 0)$	differential state	System
19	$\underline{\pi}^A_N := \text{Stack}(\pi^{A,\alpha}_N, \pi^{A,\beta}_N)$	the stack of intensive variables	System
22	$K^{B,\gamma}_N := \text{Instantiate}((t_N)^{-1}, \#)$	frequency B alpha	System
23	$\pi^{B,\gamma}_N := M^{B,\gamma} . y_N$	transport of B mechanism gamma	System
26	$y_N^o := \text{Instantiate}(y_N, \#)$	initial condition for token B	System
30	$K^{B,\delta}_N := \text{Instantiate}((t_N)^{-1}, \#)$	var doc : frequency B delta	System
32	$\pi^{B,\delta}_N := M^{B,\delta} . y_N$	effort B mechansim delta	System

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no	equation	documentation	layer
36	$\dot{y}_N := \text{Instantiate}(\dot{y}_N, \#)$	differential state for token B	System
40	$K^{A,\alpha}_N := \text{Instantiate}((t_N)^{-1}, \#)$	frequency token A	System
41	$K^{A,\beta}_N := \text{Instantiate}((t_N)^{-1}, \#)$	frequency token B	System
42	$M^{A,\alpha} := \text{Instantiate}(\#, \#)$	norming factor token A mechanism alpha	System
43	$M^{A,\beta} := \text{Instantiate}(\#, \#)$	norming factor token A mechanism beta	System
44	$\underline{\pi}^B_N := \text{Stack}(\pi^{B,\gamma}_N, \pi^{B,\delta}_N)$	the stack of intensive variables token B	System
50	$\hat{x}^{A,\alpha}_N := F_{N,A} \overset{A}{\star} \left(K^{A,\alpha}_N \cdot F_{N,A} \overset{N}{\star} \pi^{A,\alpha}_N \right)$	netflow of token A due to mechanism alpha	System
51	$\hat{x}^{A,\beta}_N := F_{N,A} \overset{A}{\star} \left(K^{A,\beta}_N \cdot F_{N,A} \overset{N}{\star} \pi^{A,\beta}_N \right)$	netflow of token A due to mechanism beta	System
52	$\hat{y}^{B,\gamma}_N := F_{N,A} \overset{A}{\star} \left(K^{B,\gamma}_N \cdot F_{N,A} \overset{N}{\star} \pi^{B,\gamma}_N \right)$	netflow of token B due to mechanism gamma	System
53	$\hat{y}^{B,\delta}_N := F_{N,A} \overset{A}{\star} \left(K^{B,\delta}_N \cdot F_{N,A} \overset{N}{\star} \pi^{B,\delta}_N \right)$	netflow of token B due to mechanism delta	System
54	$\hat{y}^{B,\delta}_N := \text{Instantiate}(\hat{y}^{B,\delta}_N, \#)$	netflow of token B due to mechanism delta	System
55	$\hat{x}^{A,\alpha}_N := \text{Instantiate}(\hat{x}^{A,\alpha}_N, \#)$	netflow of token A due to mechanism alpha	System
56	$\hat{x}^{A,\beta}_N := \text{Instantiate}(\hat{x}^{A,\beta}_N, \#)$	netflow of token A due to mechanism beta	System

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no	equation	documentation	layer
57	$\hat{y}^{B,\gamma}_N := \text{Instantiate}(\hat{y}^{B,\gamma}_N, \#)$	netflow of token B due to mechanism gamma	System
58	$\dot{x}_N := \hat{x}^{A,\alpha}_N + \hat{x}^{A,\beta}_N$	differential state	System
59	$\dot{y}_N := \hat{y}^{B,\gamma}_N + \hat{y}^{B,\delta}_N$	differential state for token B	System
60	$x_N := \int_{t^o_N}^{t^e_N} \dot{x}_N \, dt_N$	state token A	System
61	$y_N := \int_{t^o_N}^{t^e_N} \dot{y}_N \, dt_N$	state token B	System