1 Variables

2 root

		var	symbol	documentation	type	units	tokens	eqs
1		$F_{N,A}$	F	incidence matrix of directed graph	network		[]	
2		t_N	t	time	frame	s	[]	
3		#	value	numerical value	constant		[]	
4		1	one	numerical value 1	constant		[]	1
5	2	0	zero	numerical value 0	constant		[]	2
6	3	1/2	onehalf	numerical value 1/2	constant		[]	3

3 physical

		var	symbol	documentation	type	units	tokens	eqs
10	6	$F_{NS,AS}$	F_NS_AS	blick incidence matrix of directed species graph	network		[]	6
9		$P_{NS,AS}$	P_NS_AS	node species to arc species projection	projection		[]	
11		$P_{K,NK}$	P_K_NK	projection of conversion to node x conversion	projection		[]	
12		$P_{NS,KS}$	P_NS_KS	projection node x species to conversion x species	projection		[]	
13		$P_{N,NK}$	P_N_NK	projection node to node x conversion	projection		[]	
14		$P_{NK,KS}$	P_NK_KS	projection node x conversion to conversion x species	projection		[]	
15		r_{xN}	r_x	x-coordinate	frame	m	[]	
16		r_{yN}	r_y	y-coordinate	frame	m	[]	
17		r_{zN}	r_z	z-coordinate	frame	m	[]	

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	var	symbol	documentation	type	units	tokens	eqs
18	n_{NS}	n	foundation state – species mass	state	mol	['mass']	
19	U_N	U	foundation state – internal energy	state	$kg\,m^2\,s^{-2}$	['energy']	
20	S_N	S	foundation state – entropy	state	$kg\,m^2\,K^{-1}\,s^{-2}$	[]	
21	V_N	V	foundation state – volume	state	m^3	[]	
29	H_N	H	enthalpy	state	$kg\,m^2\,s^{-2}$	['energy']	13
30	A_N	A	Helmholtz energy	state	$kg\,m^2\,s^{-2}$	['energy']	14
31	G_N	G	Gibbs energy	state	$kg\,m^2\,s^{-2}$	['energy']	15
26	N^o	No	Avogadro number	constant		[]	10
27	B_N	B	Boltzmann constant	constant	$kg\,m^2\,K^{-1}\,s^{-2}$	[]	11
28	R_N	R	gas constant	constant	$kg\,m^2\,K^{-1}\,s^{-2}$	[]	12
22	p_N	p	thermodynamic pressure	effort	$kg\,m^{-1}\,s^{-2}$	['energy']	7
23	T_N	T	temperature	effort	K	['energy']	8
24	μ_{NS}	mu	chemical potential	effort	$kg\,m^2\,mol^{-1}\,s^{-2}$	['energy', 'mass']	9
32	v_{xN}	v_x	velocity in x-direction	seconaryState	ms^{-1}	[]	16
33	v_{yN}	v_y	velocity in y-direction	seconaryState	ms^{-1}	[]	17
34	v_{zN}	v_z	velocity in z-direction	seconaryState	ms^{-1}	[]	18
35	v_N	v	velocity vector	seconaryState	ms^{-1}	[]	19

4   control

	var	symbol	documentation	type	units	tokens	eqs

5   reactions

	var	symbol	documentation	type	units	tokens	eqs

6 material

	var	symbol	documentation	type	units	tokens	eqs

7 macroscopic

	var	symbol	documentation	type	units	tokens	eqs

8 solid

	var	symbol	documentation	type	units	tokens	eqs

9 fluid

	var	symbol	documentation	type	units	tokens	eqs

10 liquid

	var	symbol	documentation	type	units	tokens	eqs

11 gas

	var	symbol	documentation	type	units	tokens	eqs

12   control–reactions

	var	symbol	documentation	type	units	tokens	eqs

13   reactions–control

	var	symbol	documentation	type	units	tokens	eqs

14   control–material

	var	symbol	documentation	type	units	tokens	eqs

15   material–control

	var	symbol	documentation	type	units	tokens	eqs

16   control–macroscopic

	var	symbol	documentation	type	units	tokens	eqs

17   macroscopic–control

	var	symbol	documentation	type	units	tokens	eqs

18   reactions–material

	var	symbol	documentation	type	units	tokens	eqs

19   material–reactions

	var	symbol	documentation	type	units	tokens	eqs

20   reactions–macroscopic

	var	symbol	documentation	type	units	tokens	eqs

21   macroscopic–reactions

	var	symbol	documentation	type	units	tokens	eqs

22   material–macroscopic

	var	symbol	documentation	type	units	tokens	eqs

23   macroscopic–material

	var	symbol	documentation	type	units	tokens	eqs

24   gas–liquid

	var	symbol	documentation	type	units	tokens	eqs

25   gas–solid

	var	symbol	documentation	type	units	tokens	eqs

26   liquid–solid

	var	symbol	documentation	type	units	tokens	eqs

27 Equations

27.1 Model equations

no	equation	documentation	layer
1	$1 := Set(\#, \#)$	numerical value 1	root
2	$0 := Set(\#, \#)$	numerical value 1	root
3	$1/2 := Set(\#, \#)$	numerical value 1/2	root
6	$F_{NS,AS} := F_{N,A} \odot P_{NS,AS}$	blick incidence matrix of directed species graph	physical
7	$p_N := \frac{\partial U_N}{\partial V_N}$	thermodynamic pressure	physical
8	$T_N := \frac{\partial U_N}{\partial S_N}$	temperature	physical
9	$\mu_{NS} := \frac{\partial U_N}{\partial n_{NS}}$	chemical potential	physical
10	$N^o := Set(\#, \#)$	Avogadro number	physical
11	$B_N := Set(S_N, \#)$	Boltzmann constant	physical
12	$R_N := B_N . N^o$	gas constant	physical
13	$H_N := U_N + p_N . V_N$	enthalpy	physical
14	$A_N := U_N - T_N . S_N$	Helmholtz energy	physical
15	$G_N := U_N + p_N . V_N - T_N . S_N$	Gibbs energy	physical
16	$v_{xN} := \frac{\partial r_{xN}}{\partial t_N}$	velocity in x-direction	physical
17	$v_{yN} := \frac{\partial r_{yN}}{\partial t_N}$	velocity in y-direction	physical

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no	equation	documentation	layer
18	$v_{zN} := \frac{\partial\, r_{zN}}{\partial\, t_N}$	velocity in z-direction	physical
19	$v_N := Stack\left(v_{zN}, v_{yN}, v_{zN}\right)$	velocity vector	physical