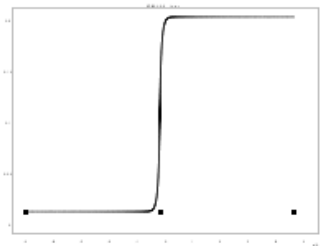
COMSOL Model Report



1. Table of Contents

2. Model Properties

Property	Value
Model name	
Author	
Company	
Department	
Reference	
URL	
Saved date	Jun 25, 2012 12:23:39 PM
Creation date	Mar 30, 2012 9:16:56 AM
COMSOL version	COMSOL 3.5.0.603

File name: /home/dmitry/Desktop/ITIES Capacitance files/1D/report.mph

Application modes and modules used in this model:

- Geom1 (1D)
  - Nernst-Planck without Electroneutrality (Chemical Engineering Module)
  - Nernst-Planck without Electroneutrality (Chemical Engineering Module)
  - Poisson's Equation

3. Constants

Name	Expression	Value	Description
c0org	1[mmol/L]	1[mol/m^3]	Initial salt conc in org medium
c0aq	1[mmol/L]	1[mol/m^3]	Initial salt conc in aqueous medium
F	96485[C/mol]	96485[s·A/mol]	Faraday const
R	8.31[J/(mol*K)]	8.31[J/(mol·K)]	Gas const
T	298[K]	298[K]	Temperature
Epsaq	80	80	dielectric constant aqueous solution
Epsorg	10	10	Dielectric const organic solution

Diff	2e-9[m*m/s]	(2e-9)[m^2/s]	diffusion coefficient of K and Cl
V0	0.1[V]	0.1[V]	potential
pA	1[1/nm]	10e8[1/m]	sigmoid parameter a
f	1	1	sigmoid parameter f
e0	8.8541878e-12[F/m]	(8.854188e-12)[F/m]	vacuum permittivity

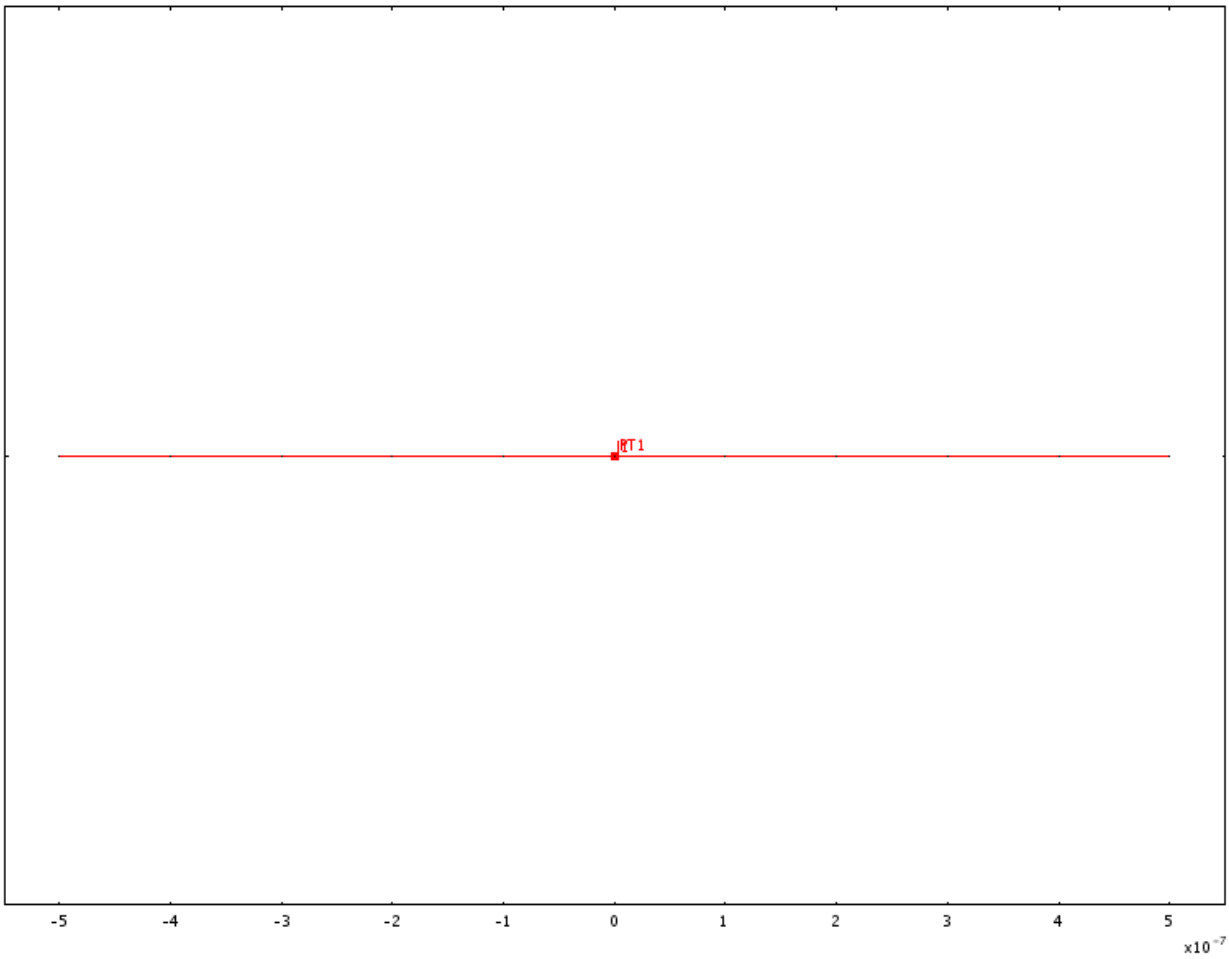
4. Global Expressions

Name	Expression	Unit	Description
uKCl	F*Diff/(R*T)	m^2/(s*V)	electric mobility K and Cl
epsSigmoidal	Epsaq+f*(Epsorg-Epsaq)/(f+exp(x/pA))		sigmoidal epsilon

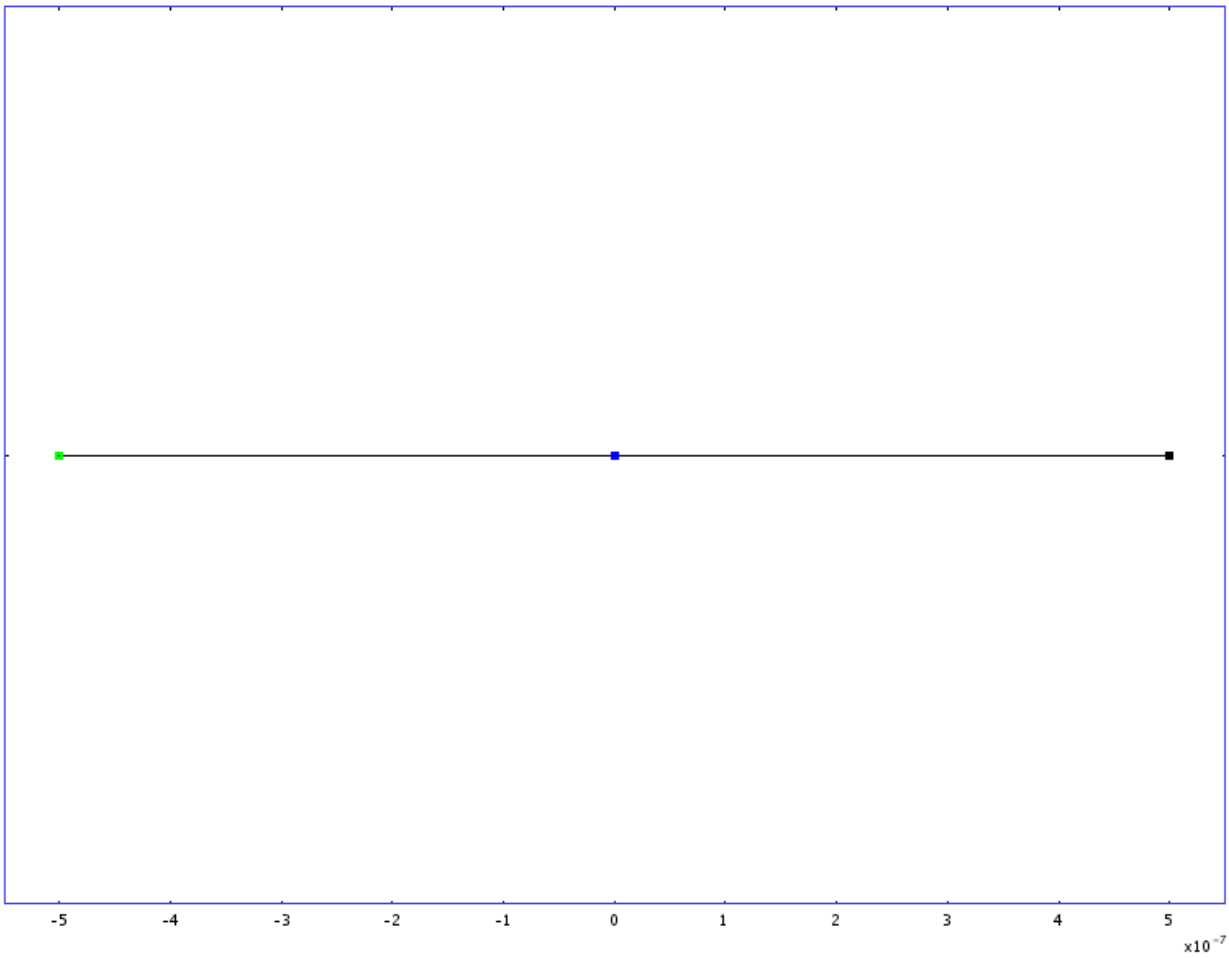
5. Geometry

Number of geometries: 1

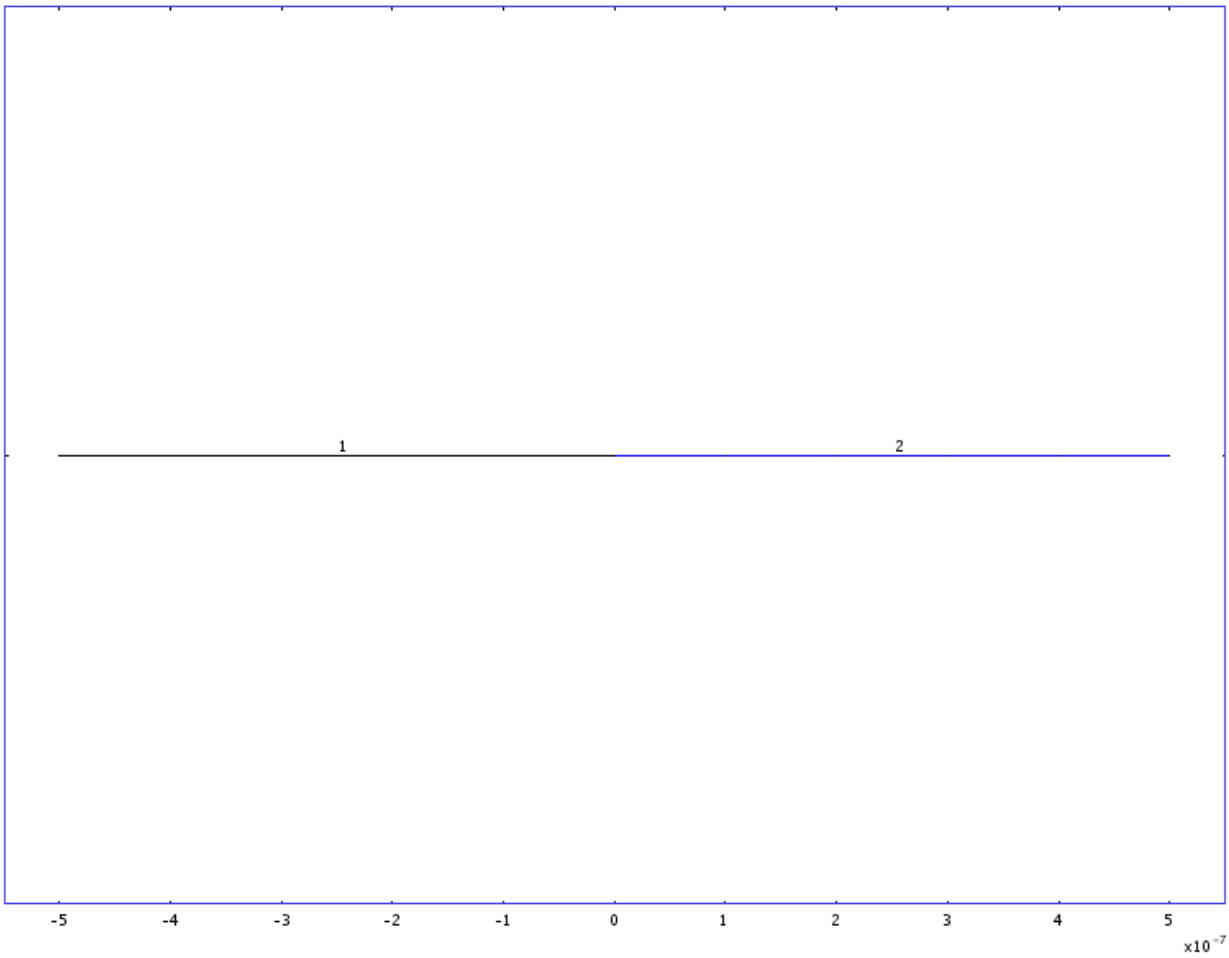
5.1. Geom1



5.1.1. Boundary mode



5.1.2. Subdomain mode



6. Geom1

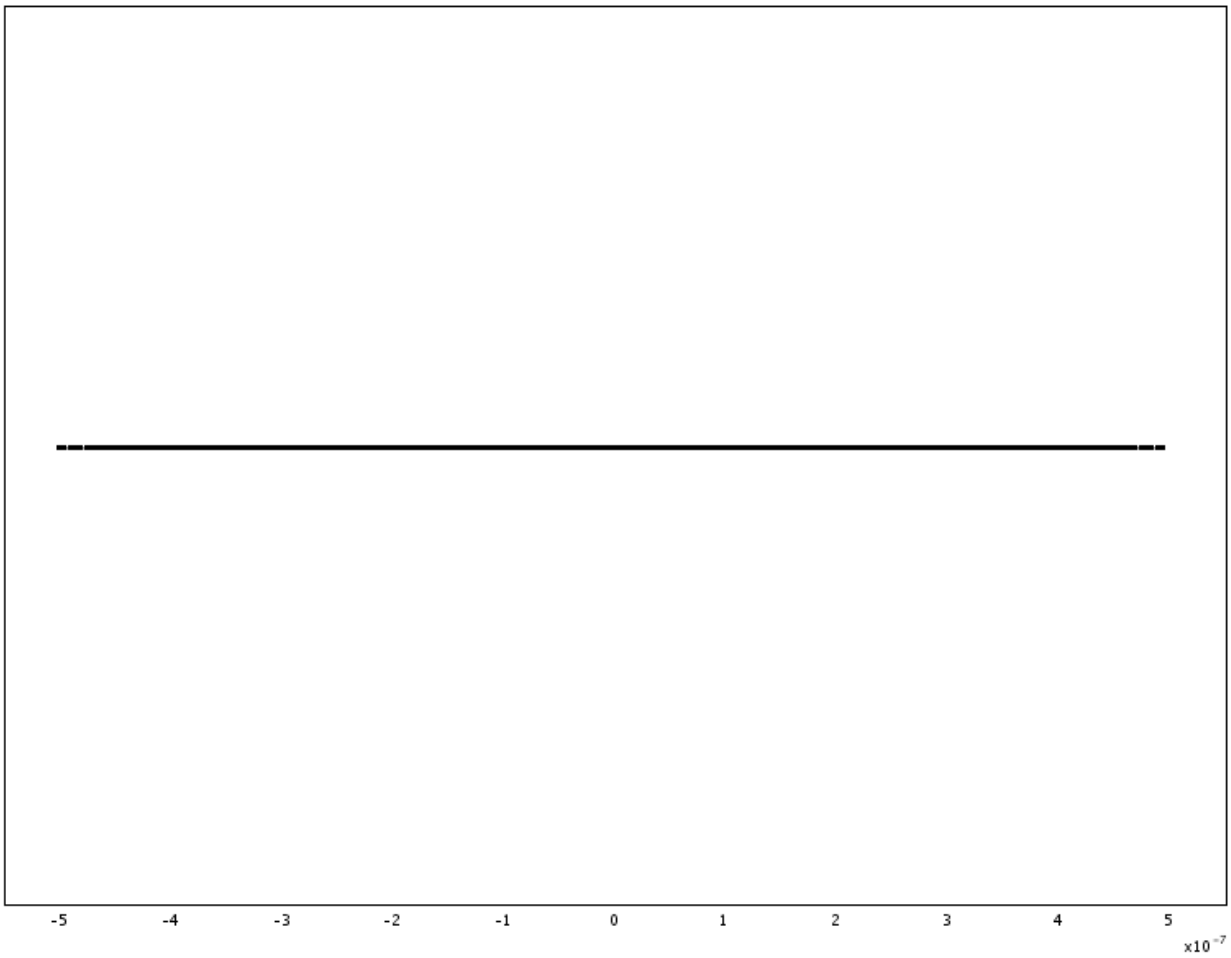
Space dimensions: 1D

Independent variables: x, y, z

6.1. Mesh

6.1.1. Mesh Statistics

Number of degrees of freedom	15761
Number of mesh points	2627
Number of elements	2626
Number of boundary elements	3
Element length ratio	0



6.2. Application Mode: Nernst-Planck without Electroneutrality (chekf)

Application mode type: Nernst-Planck without Electroneutrality (Chemical Engineering Module)

Application mode name: chekf

6.2.1. Scalar Variables

Name	Variable	Value	Unit	Description
F	F_chekf	96485.3415	s*A/mol	Faraday's constant

6.2.2. Application Mode Properties

Property	Value
Default element type	Lagrange - Quadratic
Analysis type	Stationary
Equation form	Non-conservative
Equilibrium assumption	Off
Frame	Frame (ref)
Weak constraints	Off
Constraint type	Ideal

6.2.3. Variables

Dependent variables: cKa, cCla

Shape functions: shlag(2,'cKa'), shlag(2,'cCla')

Interior boundaries not active

6.2.4. Boundary Settings

Point		1	2	3
Concentration (c0)	mol/m^3	{0;0}	{0;0}	**{c0aq;c0aq}**
type		**{cont;cont}**	{N0;N0}	**{C;C}**

6.2.5. Subdomain Settings

Subdomain		2
Diffusion coefficient (D)	m^2/s	**{Diff;Diff}**
Mobility (um)	s·mol/kg	**{Diff/R/T;Diff/R/T}**
Charge number (z)	1	**{1;-1}**
Potential (V)	V	**{u;u}**

Subdomain initial value		2
Concentration, cKa (cKa)	mol/m^3	c0aq
Concentration, cCla (cCla)	mol/m^3	c0aq

6.3. Application Mode: Nernst-Planck without Electroneutrality (chekf2)

Application mode type: Nernst-Planck without Electroneutrality (Chemical Engineering Module)

Application mode name: chekf2

6.3.1. Scalar Variables

Name	Variable	Value	Unit	Description
F	F_chekf2	96485.3415	s*A/mol	Faraday's constant

6.3.2. Application Mode Properties

Property	**Value**
Default element type	Lagrange - Quadratic
Analysis type	Stationary
Equation form	Non-conservative
Equilibrium assumption	Off
Frame	Frame (ref)
Weak constraints	Off
Constraint type	Ideal

6.3.3. Variables

Dependent variables: cKo, cClo

Shape functions: shlag(2,'cKo'), shlag(2,'cClo')

Interior boundaries not active

6.3.4. Boundary Settings

Point		2	3	1
Concentration (c0)	mol/m^3	{0;0}	{0;0}	**{c0org;c0org}**
type		{N0;N0}	**{cont;cont}**	**{C;C}**

6.3.5. Subdomain Settings

Subdomain		1
Diffusion coefficient (D)	m^2/s	**{Diff;Diff}**
Mobility (um)	s·mol/kg	**{Diff/R/T;Diff/R/T}**
Charge number (z)	1	**{1;-1}**
Potential (V)	V	**{u;u}**

Subdomain initial value		1
Concentration, cKo (cKo)	mol/m^3	c0org
Concentration, cClo (cClo)	mol/m^3	c0org

6.4. Application Mode: Poisson's Equation (poeq)

Application mode type: Poisson's Equation

Application mode name: poeq

6.4.1. Application Mode Properties

Property	Value
Default element type	Lagrange - Quadratic
Frame	Frame (ref)
Weak constraints	Off

6.4.2. Variables

Dependent variables: u

Shape functions: shlag(2,'u')

Interior boundaries not active

6.4.3. Boundary Settings

Point		3	2	1
(r)		**V0**	0	0
type		Dirichlet boundary condition	**Neumann boundary condition**	Dirichlet boundary condition

6.4.4. Subdomain Settings

Subdomain		1	2
Diffusion coefficient (c)		**e0*epsSigmoidal**	**e0*epsSigmoidal**
Source term (f)		**F*(cKo-cClo)**	**F*(cKa-cCla)**

7. Solver Settings

Solve using a script: off

Analysis type	Stationary
Auto select solver	On
Solver	Parametric
Solution form	Automatic
Symmetric	auto
Adaptive mesh refinement	Off
Optimization/Sensitivity	Off
Plot while solving	Off

7.1. Direct (UMFPACK)

Solver type: Linear system solver

Parameter	Value
Pivot threshold	0.1
Memory allocation factor	0.7

7.2. Stationary

Parameter	Value
Linearity	Automatic
Relative tolerance	1.0E-6
Maximum number of iterations	25
Manual tuning of damping parameters	Off
Highly nonlinear problem	Off
Initial damping factor	1.0
Minimum damping factor	1.0E-4
Restriction for step size update	10.0

7.3. Parametric

Parameter	Value
Parameter name	V0
Parameter values	range(-0.2,0.0050,-0.01),-1e-6,1e-6,range(0.01,0.0050,0.2)
Predictor	Linear
Manual tuning of parameter step size	Off
Initial step size	0.0
Minimum step size	0.0
Maximum step size	0.0

7.4. Advanced

Parameter	Value
Constraint handling method	Elimination
Null-space function	Automatic
Automatic assembly block size	On
Assembly block size	1000
Use Hermitian transpose of constraint matrix and in symmetry detection	Off
Use complex functions with real input	Off
Stop if error due to undefined operation	On
Store solution on file	Off
Type of scaling	Automatic
Manual scaling	
Row equilibration	On
Manual control of reassembly	Off
Load constant	On
Constraint constant	On
Mass constant	On
Damping (mass) constant	On
Jacobian constant	On
Constraint Jacobian constant	On

8. Variables

8.1. Boundary

8.1.1. Boundary 1

Name	Description	Unit	Expression

ndflux_cKa_chekf	Normal diffusive flux, cKa	mol/(m^2*s)	
ncflux_cKa_chekf	Normal convective flux, cKa	mol/(m^2*s)	
nmflux_cKa_chekf	Normal electrophoretic flux, cKa	mol/(m^2*s)	
ntflux_cKa_chekf	Normal total flux, cKa	mol/(m^2*s)	
ndflux_cCla_chekf	Normal diffusive flux, cCla	mol/(m^2*s)	
ncflux_cCla_chekf	Normal convective flux, cCla	mol/(m^2*s)	
nmflux_cCla_chekf	Normal electrophoretic flux, cCla	mol/(m^2*s)	
ntflux_cCla_chekf	Normal total flux, cCla	mol/(m^2*s)	
ndflux_cKo_chekf2	Normal diffusive flux, cKo	mol/(m^2*s)	nx_chekf2 * dflux_cKo_chekf2
ncflux_cKo_chekf2	Normal convective flux, cKo	mol/(m^2*s)	nx_chekf2 * cflux_cKo_chekf2
nmflux_cKo_chekf2	Normal electrophoretic flux, cKo	mol/(m^2*s)	nx_chekf2 * mflux_cKo_chekf2
ntflux_cKo_chekf2	Normal total flux, cKo	mol/(m^2*s)	nx_chekf2 * tflux_cKo_chekf2
ndflux_cClo_chekf2	Normal diffusive flux, cClo	mol/(m^2*s)	nx_chekf2 * dflux_cClo_chekf2
ncflux_cClo_chekf2	Normal convective flux, cClo	mol/(m^2*s)	nx_chekf2 * cflux_cClo_chekf2
nmflux_cClo_chekf2	Normal electrophoretic flux, cClo	mol/(m^2*s)	nx_chekf2 * mflux_cClo_chekf2
ntflux_cClo_chekf2	Normal total flux, cClo	mol/(m^2*s)	nx_chekf2 * tflux_cClo_chekf2

8.1.2. Boundary 2

Name	Description	Unit	Expression
ndflux_cKa_chekf	Normal diffusive flux, cKa	mol/(m^2*s)	nx_chekf * dflux_cKa_chekf
ncflux_cKa_chekf	Normal convective flux, cKa	mol/(m^2*s)	nx_chekf * cflux_cKa_chekf
nmflux_cKa_chekf	Normal electrophoretic flux, cKa	mol/(m^2*s)	nx_chekf * mflux_cKa_chekf
ntflux_cKa_chekf	Normal total flux, cKa	mol/(m^2*s)	nx_chekf * tflux_cKa_chekf
ndflux_cCla_chekf	Normal diffusive flux, cCla	mol/(m^2*s)	nx_chekf * dflux_cCla_chekf
ncflux_cCla_chekf	Normal convective flux, cCla	mol/(m^2*s)	nx_chekf * cflux_cCla_chekf
nmflux_cCla_chekf	Normal electrophoretic flux, cCla	mol/(m^2*s)	nx_chekf * mflux_cCla_chekf
ntflux_cCla_chekf	Normal total flux, cCla	mol/(m^2*s)	nx_chekf * tflux_cCla_chekf
ndflux_cKo_chekf2	Normal diffusive flux, cKo	mol/(m^2*s)	nx_chekf2 * dflux_cKo_chekf2
ncflux_cKo_chekf2	Normal convective flux, cKo	mol/(m^2*s)	nx_chekf2 * cflux_cKo_chekf2
nmflux_cKo_chekf2	Normal electrophoretic flux, cKo	mol/(m^2*s)	nx_chekf2 * mflux_cKo_chekf2
ntflux_cKo_chekf2	Normal total flux, cKo	mol/(m^2*s)	nx_chekf2 * tflux_cKo_chekf2
ndflux_cClo_chekf2	Normal diffusive flux, cClo	mol/(m^2*s)	nx_chekf2 * dflux_cClo_chekf2
ncflux_cClo_chekf2	Normal convective flux, cClo	mol/(m^2*s)	nx_chekf2 * cflux_cClo_chekf2
nmflux_cClo_chekf2	Normal electrophoretic flux, cClo	mol/(m^2*s)	nx_chekf2 * mflux_cClo_chekf2
ntflux_cClo_chekf2	Normal total flux, cClo	mol/(m^2*s)	nx_chekf2 * tflux_cClo_chekf2

8.1.3. Boundary 3

Name	Description	Unit	Expression
ndflux_cKa_chekf	Normal diffusive flux, cKa	mol/(m^2*s)	nx_chekf * dflux_cKa_chekf
ncflux_cKa_chekf	Normal convective flux, cKa	mol/(m^2*s)	nx_chekf * cflux_cKa_chekf
nmflux_cKa_chekf	Normal electrophoretic flux, cKa	mol/(m^2*s)	nx_chekf * mflux_cKa_chekf
ntflux_cKa_chekf	Normal total flux, cKa	mol/(m^2*s)	nx_chekf * tflux_cKa_chekf
ndflux_cCla_chekf	Normal diffusive flux, cCla	mol/(m^2*s)	nx_chekf * dflux_cCla_chekf
ncflux_cCla_chekf	Normal convective flux, cCla	mol/(m^2*s)	nx_chekf * cflux_cCla_chekf
nmflux_cCla_chekf	Normal electrophoretic flux, cCla	mol/(m^2*s)	nx_chekf * mflux_cCla_chekf
ntflux_cCla_chekf	Normal total flux, cCla	mol/(m^2*s)	nx_chekf * tflux_cCla_chekf
ndflux_cKo_chekf2	Normal diffusive flux, cKo	mol/(m^2*s)	
ncflux_cKo_chekf2	Normal convective flux, cKo	mol/(m^2*s)	
nmflux_cKo_chekf2	Normal electrophoretic flux, cKo	mol/(m^2*s)	
ntflux_cKo_chekf2	Normal total flux, cKo	mol/(m^2*s)	
ndflux_cClo_chekf2	Normal diffusive flux, cClo	mol/(m^2*s)	
ncflux_cClo_chekf2	Normal convective flux, cClo	mol/(m^2*s)	
nmflux_cClo_chekf2	Normal electrophoretic flux, cClo	mol/(m^2*s)	
ntflux_cClo_chekf2	Normal total flux, cClo	mol/(m^2*s)	

8.2. Subdomain

8.2.1. Subdomain 1

Name	Description	Unit	Expression
beta_cKa_x_chekf	Convective field, cKa, x component	m/s	
grad_cKa_chekf	Concentration gradient, cKa	mol/m^4	
dflux_cKa_chekf	Diffusive flux, cKa	mol/(m^2*s)	
cflux_cKa_chekf	Convective flux, cKa	mol/(m^2*s)	
mflux_cKa_chekf	Electrophoretic flux, cKa	mol/(m^2*s)	
tflux_cKa_chekf	Total flux, cKa	mol/(m^2*s)	
cellPe_cKa_chekf	Cell Peclet number, cKa	1	
Dm_cKa_chekf	Mean diffusion coefficient, cKa	m^2/s	
res_cKa_chekf	Equation residual for cKa	mol/(m^3*s)	
res_sc_cKa_chekf	Shock capturing residual for cKa	mol/(m^3*s)	
da_cKa_chekf	Total time scale factor, cKa	1	
gradpot_cKa_x_chekf	Potential gradient, cKa, x component	V/m	
beta_cCla_x_chekf	Convective field, cCla, x component	m/s	
grad_cCla_chekf	Concentration gradient, cCla	mol/m^4	
dflux_cCla_chekf	Diffusive flux, cCla	mol/(m^2*s)	
cflux_cCla_chekf	Convective flux, cCla	mol/(m^2*s)	
mflux_cCla_chekf	Electrophoretic flux, cCla	mol/(m^2*s)	
tflux_cCla_chekf	Total flux, cCla	mol/(m^2*s)	
cellPe_cCla_chekf	Cell Peclet number, cCla	1	
Dm_cCla_chekf	Mean diffusion coefficient, cCla	m^2/s	
res_cCla_chekf	Equation residual for cCla	mol/(m^3*s)	
res_sc_cCla_chekf	Shock capturing residual for cCla	mol/(m^3*s)	

da_cCla_chekf	Total time scale factor, cCla	1	
gradpot_cCla_x_chekf	Potential gradient, cCla, x component	V/m	
beta_cKo_x_chekf2	Convective field, cKo, x component	m/s	u_cKo_chekf2-z_cKo_chekf2 * um_cKo_chekf2 * F_chekf2 * gradpot_cKo_x_chekf2
grad_cKo_chekf2	Concentration gradient, cKo	mol/m^4	cKox
dflux_cKo_chekf2	Diffusive flux, cKo	mol/(m^2*s)	-D_cKo_chekf2 * cKox
cflux_cKo_chekf2	Convective flux, cKo	mol/(m^2*s)	cKo * u_cKo_chekf2
mflux_cKo_chekf2	Electrophoretic flux, cKo	mol/(m^2*s)	-z_cKo_chekf2 * um_cKo_chekf2 * F_chekf2 * cKo * gradpot_cKo_x_chekf2
tflux_cKo_chekf2	Total flux, cKo	mol/(m^2*s)	dflux_cKo_chekf2+cflux_cKo_chekf2+mflux_cKo_chekf2
cellPe_cKo_chekf2	Cell Peclet number, cKo	1	h * sqrt(beta_cKo_x_chekf2^2)/Dm_cKo_chekf2
Dm_cKo_chekf2	Mean diffusion coefficient, cKo	m^2/s	D_cKo_chekf2
res_cKo_chekf2	Equation residual for cKo	mol/(m^3*s)	-D_cKo_chekf2 * cKoxx+cKox * (u_cKo_chekf2-z_cKo_chekf2 * um_cKo_chekf2 * F_chekf2 * gradpot_cKo_x_chekf2)-R_cKo_chekf2
res_sc_cKo_chekf2	Shock capturing residual for cKo	mol/(m^3*s)	cKox * (u_cKo_chekf2-z_cKo_chekf2 * um_cKo_chekf2 F_chekf2 * gradpot_cKo_x_chekf2)-R_cKo_chekf2
da_cKo_chekf2	Total time scale factor, cKo	1	Dts_cKo_chekf2
gradpot_cKo_x_chekf2	Potential gradient, cKo, x component	V/m	d(u,x)
beta_cClo_x_chekf2	Convective field, cClo, x component	m/s	u_cClo_chekf2-z_cClo_chekf2 * um_cClo_chekf2 * F_chekf2 * gradpot_cClo_x_chekf2
grad_cClo_chekf2	Concentration gradient, cClo	mol/m^4	cClox
dflux_cClo_chekf2	Diffusive flux, cClo	mol/(m^2*s)	-D_cClo_chekf2 * cClox
cflux_cClo_chekf2	Convective flux, cClo	mol/(m^2*s)	cClo * u_cClo_chekf2
mflux_cClo_chekf2	Electrophoretic flux, cClo	mol/(m^2*s)	-z_cClo_chekf2 * um_cClo_chekf2 * F_chekf2 * cClo * gradpot_cClo_x_chekf2
tflux_cClo_chekf2	Total flux, cClo	mol/(m^2*s)	dflux_cClo_chekf2+cflux_cClo_chekf2+mflux_cClo_chek
cellPe_cClo_chekf2	Cell Peclet number, cClo	1	h * sqrt(beta_cClo_x_chekf2^2)/Dm_cClo_chekf2
Dm_cClo_chekf2	Mean diffusion coefficient, cClo	m^2/s	D_cClo_chekf2
res_cClo_chekf2	Equation residual for cClo	mol/(m^3*s)	-D_cClo_chekf2 * cCloxx+cClox * (u_cClo_chekf2-z_cClo_chekf2 * um_cClo_chekf2 * F_chekf2 * gradpot_cClo_x_chekf2)-R_cClo_chekf2
res_sc_cClo_chekf2	Shock capturing residual for cClo	mol/(m^3*s)	cClox * (u_cClo_chekf2-z_cClo_chekf2 * um_cClo_chek * F_chekf2 * gradpot_cClo_x_chekf2)-R_cClo_chekf2

da_cClo_chekf2	Total time scale factor, cClo	1	Dts_cClo_chekf2
gradpot_cClo_x_chekf2	Potential gradient, cClo, x component	V/m	d(u,x)

8.2.2. Subdomain 2

Name	Description	Unit	Expression
beta_cKa_x_chekf	Convective field, cKa, x component	m/s	u_cKa_chekf-z_cKa_chekf * um_cKa_chekf * F_chekf * gradpot_cKa_x_chekf
grad_cKa_chekf	Concentration gradient, cKa	mol/m^4	cKax
dflux_cKa_chekf	Diffusive flux, cKa	mol/(m^2*s)	-D_cKa_chekf * cKax
cflux_cKa_chekf	Convective flux, cKa	mol/(m^2*s)	cKa * u_cKa_chekf
mflux_cKa_chekf	Electrophoretic flux, cKa	mol/(m^2*s)	-z_cKa_chekf * um_cKa_chekf * F_chekf * cKa * gradpot_cKa_x_chekf
tflux_cKa_chekf	Total flux, cKa	mol/(m^2*s)	dflux_cKa_chekf+cflux_cKa_chekf+mflux_cKa_chekf
cellPe_cKa_chekf	Cell Peclet number, cKa	1	h * sqrt(beta_cKa_x_chekf^2)/Dm_cKa_chekf
Dm_cKa_chekf	Mean diffusion coefficient, cKa	m^2/s	D_cKa_chekf
res_cKa_chekf	Equation residual for cKa	mol/(m^3*s)	-D_cKa_chekf * cKaxx+cKax * (u_cKa_chekf-z_cKa_chekf * um_cKa_chekf * F_chekf * gradpot_cKa_x_chekf)-R_cKa_chekf
res_sc_cKa_chekf	Shock capturing residual for cKa	mol/(m^3*s)	cKax * (u_cKa_chekf-z_cKa_chekf * um_cKa_chekf * F_chekf * gradpot_cKa_x_chekf)-R_cKa_chekf
da_cKa_chekf	Total time scale factor, cKa	1	Dts_cKa_chekf
gradpot_cKa_x_chekf	Potential gradient, cKa, x component	V/m	d(u,x)
beta_cCla_x_chekf	Convective field, cCla, x component	m/s	u_cCla_chekf-z_cCla_chekf * um_cCla_chekf * F_chekf * gradpot_cCla_x_chekf
grad_cCla_chekf	Concentration gradient, cCla	mol/m^4	cClax
dflux_cCla_chekf	Diffusive flux, cCla	mol/(m^2*s)	-D_cCla_chekf * cClax
cflux_cCla_chekf	Convective flux, cCla	mol/(m^2*s)	cCla * u_cCla_chekf
mflux_cCla_chekf	Electrophoretic flux, cCla	mol/(m^2*s)	-z_cCla_chekf * um_cCla_chekf * F_chekf * cCla * gradpot_cCla_x_chekf
tflux_cCla_chekf	Total flux, cCla	mol/(m^2*s)	dflux_cCla_chekf+cflux_cCla_chekf+mflux_cCla_chekf
cellPe_cCla_chekf	Cell Peclet number, cCla	1	h * sqrt(beta_cCla_x_chekf^2)/Dm_cCla_chekf
Dm_cCla_chekf	Mean diffusion coefficient, cCla	m^2/s	D_cCla_chekf
res_cCla_chekf	Equation residual for cCla	mol/(m^3*s)	-D_cCla_chekf * cClaxx+cClax * (u_cCla_chekf-z_cCla_chekf * um_cCla_chekf * F_chekf * gradpot_cCla_x_chekf)-R_cCla_chekf

res_sc_cCla_chekf	Shock capturing residual for cCla	mol/(m^3*s)	cClax * (u_cCla_chekf-z_cCla_chekf * um_cCla_chekf * F_chekf * gradpot_cCla_x_chekf)-R_cCla_chekf
da_cCla_chekf	Total time scale factor, cCla	1	Dts_cCla_chekf
gradpot_cCla_x_chekf	Potential gradient, cCla, x component	V/m	d(u,x)
beta_cKo_x_chekf2	Convective field, cKo, x component	m/s	
grad_cKo_chekf2	Concentration gradient, cKo	mol/m^4	
dflux_cKo_chekf2	Diffusive flux, cKo	mol/(m^2*s)	
cflux_cKo_chekf2	Convective flux, cKo	mol/(m^2*s)	
mflux_cKo_chekf2	Electrophoretic flux, cKo	mol/(m^2*s)	
tflux_cKo_chekf2	Total flux, cKo	mol/(m^2*s)	
cellPe_cKo_chekf2	Cell Peclet number, cKo	1	
Dm_cKo_chekf2	Mean diffusion coefficient, cKo	m^2/s	
res_cKo_chekf2	Equation residual for cKo	mol/(m^3*s)	
res_sc_cKo_chekf2	Shock capturing residual for cKo	mol/(m^3*s)	
da_cKo_chekf2	Total time scale factor, cKo	1	
gradpot_cKo_x_chekf2	Potential gradient, cKo, x component	V/m	
beta_cClo_x_chekf2	Convective field, cClo, x component	m/s	
grad_cClo_chekf2	Concentration gradient, cClo	mol/m^4	
dflux_cClo_chekf2	Diffusive flux, cClo	mol/(m^2*s)	
cflux_cClo_chekf2	Convective flux, cClo	mol/(m^2*s)	
mflux_cClo_chekf2	Electrophoretic flux, cClo	mol/(m^2*s)	
tflux_cClo_chekf2	Total flux, cClo	mol/(m^2*s)	
cellPe_cClo_chekf2	Cell Peclet number, cClo	1	
Dm_cClo_chekf2	Mean diffusion coefficient, cClo	m^2/s	
res_cClo_chekf2	Equation residual for cClo	mol/(m^3*s)	

res_sc_cClo_chekf2	Shock capturing residual for cClo	mol/(m^3*s)	
da_cClo_chekf2	Total time scale factor, cClo	1	
gradpot_cClo_x_chekf2	Potential gradient, cClo, x component	V/m	