Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Supplemental Information:

Single Liquid Aerosol Nano-Impact Electrochemistry: Accessing the Droplet | Air Interface

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Supplemental Information

Equation S1. Calculation of Pt Disk Radii from Steady State Current

The concentration of ferrocyanide can be calculated using the steady state current equation $i_{ss} = 4nFDCa$, where *n* is the stoichiometric number of electrons, *F* is Faraday's constant (96485 C•mol^{-1}), *D* is the diffusion coefficient of redox species (6.4 x 10^{-10} m^2•s^{-1}), *C* is the concentration (300mM), and *a* is the radius of the ultramicroelectrode (the value we calculate). Thus for a cyclic voltammogram with a limiting current of 50 x 10^{-9} A (from **Table 1**, 500nL Droplet Trial #1):

Pt Disk #1: (4.90 x 10^{-8} A) = (4)(1)(96485 C•mol^{-1})(6.7 x 10^{-10} m^2•s^{-1})*(300mM)*(***a***)

a = <u>0.63 µm radius</u>

Pt Disk #1: (4.99 x 10^{-8} A) = (4)(1)(96485 C•mol^{-1})(6.7 x 10^{-10} m^2•s^{-1})*(300mM)*(***a***)

a = <u>0.64 µm radius</u>

Disk diameter from optical microscopy: 1.3 µm

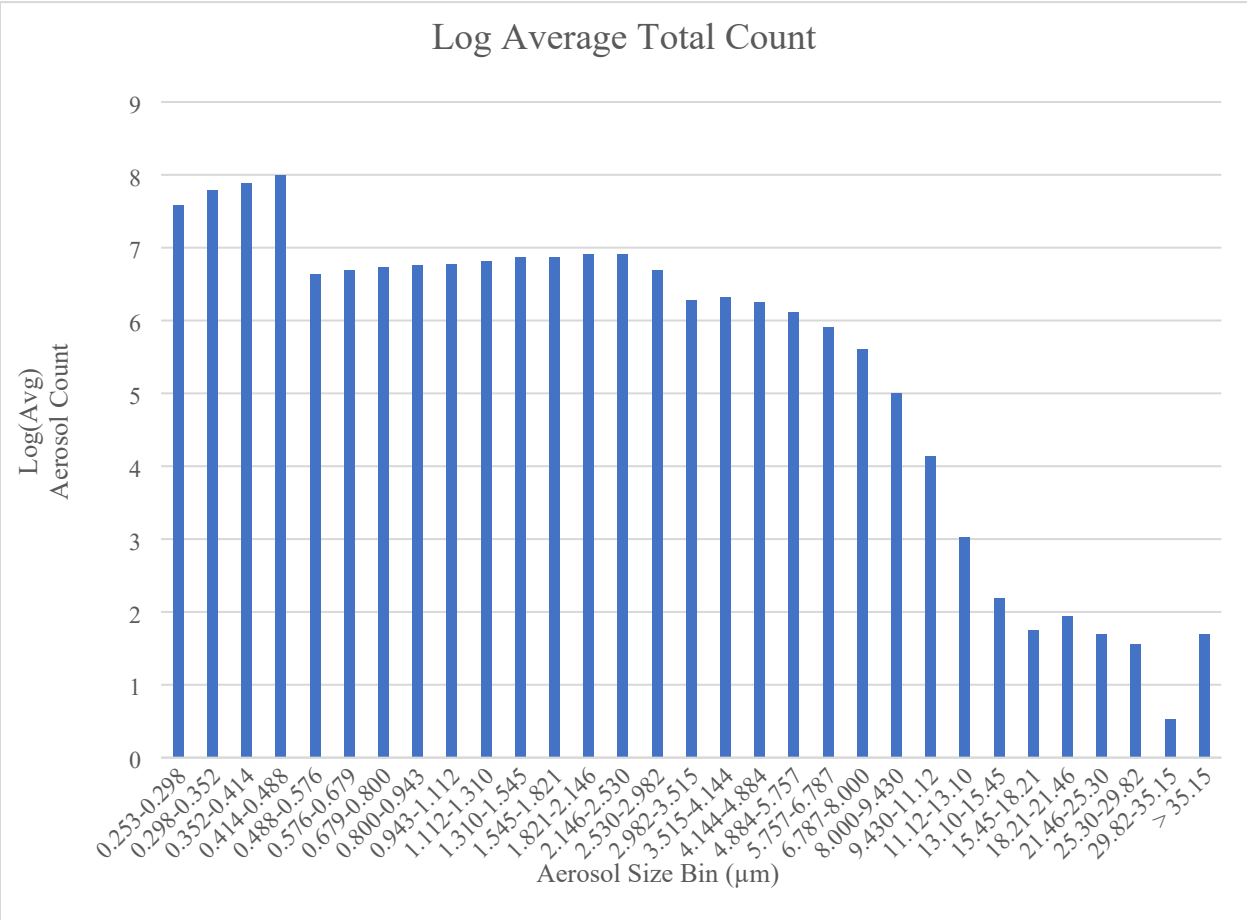
Percent Difference:

Disk #1: [(2*0.63)-1.3]/1.3*100 = -3.1%

Disk #2: [(2*0.64)-1.3]/1.3*100 = -1.5%

Figure S1. Histogram and Raw Count of 300mM hexacyanoferrate(II/III) Aerosols

The histogram shows the log of the average aerosol count per size bin across three nebulization runs (~1 minute per run). While there are a small amount of aerosols in the desired size range (diameter ≥ 20 μm), there are enough to expect stochastic collisions over an experimental time of similar duration. The raw aerosol count has been included below as well. The distance from the nebulizer to the instrument inlet was held at ~2.5 cm.



Raw Count

size channel [µm]	0.253-0.298	0.298-0.352	0.352-0.414	0.414-0.488	0.488-0.576	0.576-0.67	0.679-0.800	0.800-0.943	0.943-1.112	1.112-1.310	1.310-1.545	1.545-1.821	1.821-2.146	2.146-2.530	2.530-2.982	2.982-3.515	3.515-4.144	4.144-4.884	4.884-5.757	5.757-6.787	6.787-8.000	8.000-9.431	9.430-11.11	11.12-13.1	13.10-15.4	15.45-18.2	18.21-21.4	21.46-25.3	25.30-29.8	29.82-35.1	> 35.15
date&time / mean diameter [µm]	0.275	0.324	0.382	0.449	0.53	0.625	0.737	0.869	1.024	1.207	1.423	1.677	1.977	2.33	2.747	3.238	3.817	4.499	5.303	6.251	7.369	8.686	10.24	12.069	14.227	16.773	19.768	23.301	27.467	32.375	41.431
1/23/2023 3:55:56 PM	694550	776160	847580	1186300	465700	359630	259150	198610	151550	137630	134230	117140	123150	108810	0	0	0	0	0	59760	133070	32970	3090	180	20	0	10	0	0	0	10
1/23/2023 3:56:02 PM	7921310	11852980	10043320	4291520	782600	248890	22160	1850	100	0	0	0	0	0	0	0	0	0	0	0	0	0	990	90	10	0	20	20	20	0	0
1/23/2023 3:56:08 PM	7762000	12023520	9778510	3957590	702360	192720	14680	1300	200	0	0	0	0	0	0	0	0	0	0	0	0	0	560	130	0	0	0	40	10	0	10
1/23/2023 3:56:14 PM	6471930	11516740	14301690	12978070	384300	673990	738820	789030	735830	717920	673940	590010	528300	487230	0	0	0	0	249840	206170	73200	16450	1700	110	30	10	0	10	0	0	0
1/23/2023 3:56:20 PM	4976090	8454220	11816590	15021450	79330	132230	245930	423640	646420	1024240	1447020	1627990	1563930	1215460	0	0	225630	525800	332160	158990	55430	11740	1130	80	0	20	20	0	0	0	0
1/23/2023 3:56:26 PM	3592560	5939310	8586540	14449320	143250	218970	287260	380220	465760	619510	828040	1085580	1513560	1850800	1226350	291490	625280	425210	250940	124690	49030	11480	1760	210	30	10	0	10	0	0	0
1/23/2023 3:56:32 PM	5391130	8940490	12142360	14150410	90900	281700	566940	867670	967050	1047340	1069330	998230	1015870	994360	0	0	0	253990	454500	257550	108210	29690	3960	280	30	40	50	0	10	0	20
1/23/2023 3:56:38 PM	6279680	10739630	13633840	13688290	122270	375550	738720	1085580	1357720	1157820	1111900	912340	735570	534640	0	0	0	0	202080	103160	25790	3250	220	30	10	30	20	20	0	0	0
1/23/2023 3:56:44 PM	6212750	11078960	13653280	13493170	139170	447800	810090	1090770	1111910	1054120	984050	827390	719230	555590	0	0	0	0	158140	138190	54410	12850	1990	130	10	10	10	10	0	0	0
1/23/2023 3:56:50 PM	3237190	5382270	8074970	13991840	155050	253480	316480	374760	446480	543350	741420	956350	1408160	2018230	1288540	222500	711050	499520	303050	149890	59420	13610	1550	140	20	0	10	0	10	0	0
1/23/2023 3:56:56 PM	7339460	12494510	14561860	11799690	448820	1050340	1126670	883440	634420	503340	436400	355600	298720	203190	0	0	0	0	0	0	81910	21670	2850	150	30	10	30	0	0	0	20
Sum Run 1	59878850	99198790	117445540	119001450	3513750	4234700	5126800	6066850	6317440	6805270	7426330	7470630	7806460	7968310	7514890	5139900	1561960	1704520	1748630	1297320	717640	176250	22830	1720	210	110	180	110	70	0	60
1/23/2023 3:58:03 PM	43030	24600	15410	8870	3000	1050	350	50	50	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/23/2023 3:58:09 PM	2758280	3996240	5147570	8929020	659600	807820	801940	787830	705330	712080	740680	720270	759850	735710	670700	396150	327190	212640	109700	47960	16770	3610	380	70	20	0	0	0	0	0	0
1/23/2023 3:58:15 PM	2900940	4016330	5141050	8826300	595750	753900	804660	759380	719020	698830	741810	710510	728750	719220	1116070	543810	90510	61900	35830	17200	6960	2410	610	60	10	0	0	0	0	0	0
1/23/2023 3:58:21 PM	546800	579540	626870	804650	432310	297210	194040	125790	93710	81470	70590	59570	51500	44640	7320	23540	44280	28820	15490	8000	3700	1470	700	50	10	10	30	0	0	0	20
1/23/2023 3:58:27 PM	935140	1274020	1601360	2217640	894630	607990	415300	294200	216090	183420	159890	142890	130330	110000	82160	67560	60680	38960	20370	11150	5550	2360	1110	190	20	10	10	0	0	0	10
1/23/2023 3:58:33 PM	1111870	1515550	1818560	2595080	950000	680600	465890	336700	250920	211410	199240	158770	151670	133790	153150	103430	55640	36230	19780	12340	7240	3190	1490	180	10	0	0	0	10	0	0
1/23/2023 3:58:39 PM	124160	82610	67950	76170	53790	43860	22380	15460	10460	9230	8310	7640	5270	3870	0	0	0	0	0	5720	7030	1810	370	30	0	0	10	0	0	0	0
1/23/2023 3:58:45 PM	2798880	4197270	5554920	9520060	456240	665880	777010	835080	861660	865910	964490	939950	952270	914320	882280	449010	231020	137860	67970	33990	14780	3540	610	30	40	0	0	0	0	0	0
1/23/2023 3:58:51 PM	2562050	3833640	5024720	8631330	630360	832370	877810	915860	788680	807820	833030	757520	778010	706830	684560	382480	211080	117770	52550	22680	7730	1140	180	0	0	0	0	0	0	0	0
1/23/2023 3:58:57 PM	2323400	3415090	4566550	7698850	722870	926830	951800	901770	824180	766840	741520	698890	686080	619490	594000	282260	153210	93310	49590	23810	10410	2670	640	40	10	0	0	0	0	0	0
1/23/2023 3:59:03 PM	1814320	2683490	3270370	5376650	1024640	1034940	869490	698540	537460	472700	447820	395380	372690	340210	0	0	0	241860	287090	152170	62020	16830	2520	130	30	0	0	0	0	0	0
Sum Run 2	17918870	25618380	32833330	54685220	6423190	6654450	6180670	5670660	5007560	4809510	4907430	4591390	4616420	4328080	4190240	2248240	1173610	969350	658370	335020	142190	39030	8610	780	150	20	50	10	10	0	40
1/23/2023 4:00:06 PM	44050	25650	15110	7420	3300	1250	400	0	0	150	0	0	50	0	0	0	0	0	0	0	0	0	10	40	0	0	10	10	10	0	20
1/23/2023 4:00:12 PM	2797360	4080830	5412850	7882550	716500	891950	931360	904090	763050	691300	635110	549650	501760	464290	390260	240910	202160	119600	52690	18680	5200	1000	90	10	0	0	0	0	0	0	0
1/23/2023 4:00:18 PM	3015760	4980870	7095600	12922680	209560	332540	411830	529450	556800	705810	887560	1039780	1250990	1478760	1738070	674340	340700	212010	107840	46950	16810	3740	560	80	10	0	0	0	0	0	0
1/23/2023 4:00:24 PM	3155360	5180680	7657950	13023110	218430	322670	392250	461100	497270	640400	837810	1068820	1407970	1641690	1680190	519750	302730	188130	98890	41170	14060	2700	420	20	0	0	0	0	0	0	0
1/23/2023 4:00:30 PM	3183950	5474340	7992890	13709410	139400	229590	306060	380940	508540	694650	941380	1237610	1630000	1708440	1420180	397350	388280	262450	151520	74720	29810	6920	810	10	10	0	0	0	10	0	0
1/23/2023 4:00:36 PM	1836270	2849810	3919520	6337040	893860	916700	830520	666200	548260	512500	498770	464710	465030	454890	0	75780	432740	267980	138380	58280	20620	4460	620	50	20	0	0	0	0	0	0
1/23/2023 4:00:42 PM	3165580	4638020	6575700	12132510	275350	418740	515790	607190	646100	753030	930700	1047310	1209690	1291990	793400	409080	633840	426620	260410	112500	54930	14160	1950	120	20	0	0	0	10	0	20
1/23/2023 4:00:48 PM	3137790	4932110	7209100	13078220	211120	317170	398900	495060	553840	703470	876940	1031320	1263490	1502960	1257270	474240	568940	380800	215790	107280	42830	9880	1250	90	20	10	0	0	10	0	10
1/23/2023 4:00:54 PM	3798290	6529990	9459880	14485040	95580	146520	208700	296230	411600	659690	983610	1327110	1793980	1936350	813600	76810	668460	459370	270140	112340	48410	12350	1490	60	10	20	0	0	0	0	0
1/23/2023 4:01:00 PM	5396300	9252250	12188800	14044470	53820	147870	302540	573320	896320	1226590	1541690	1517620	1315010	976310	0	0	0	338350	196740	78980	25540	4950	470	40	10	10	0	0	0	0	0
1/23/2023 4:01:06 PM	6229440	10691570	13391710	14176610	59910	174680	414600	797480	1175520	1474230	1547420	1237900	914130	559190	0	0	0	0	0	129760	94280	23360	2660	140	0	0	10	10	0	0	0
Sum Run 3	35760150	58637920	80918110	121796060	2876830	3899680	4712950	5710360	6557300	8061820	9680990	10531830	11752100	12014870	8092970	2868180	3517850	2651010	1402400	820660	352490	83520	10330	660	100	40	30	30	30	10	50
Average	37852556.7	61151696.7	77064660	98494343.33	4271256.7	4929610	5340178.3	5826196.7	5960766.7	6558866.7	7338250	7531283.33	8091670	8103753.33	4932700	1876803.3	2091140	1775260	1299800	817666.67	404173.3	99600	13923.33	1053.333	153.3333	56.66667	86.66667	50	36.66667	3.333333	50

Figure S2. Amperometric *i*-t Trace of 300mM hexacyanoferrate (II/III) Aerosols at Reductive Potentials. The nebulization begins at 30s and ends at 110s. A control of ultrapure water nebulized in the same timeframe has been overlayed for comparison. Discrete aerosol events can be seen at 31, 38 and 41s. The distance from the nebulizer to the electrode tip was held at ~2.5 cm.

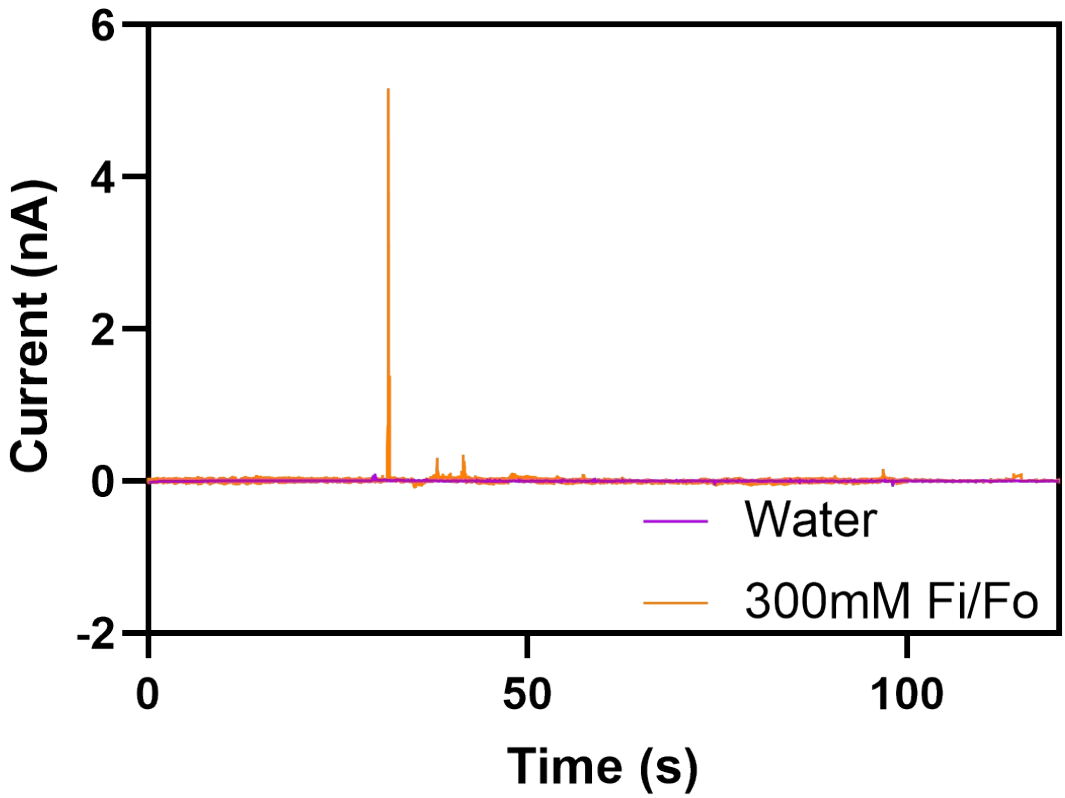


Table S1: Comparison of Steady State Current in Relation to Electrode Distance from Aerosol Boundary. The full COMSOL parameters can be seen below. As the droplet boundary approaches the working electrode, the current response decreases.

Electrode Distance from Droplet Boundary (μm)	Steady State Current (nA)
2.5	-19.7
1.3	-17.0
0.6	-12.9

Materials and Methods

Materials. Quartz theta capillaries (0.90mm I.D.; 1.2mm O.D.; 7.5cm length) were purchased from Sutter Instruments. The 25 micrometer platinum (Pt) thread (99.95% metals basis) was purchased from Alfa Aesar. Potassium ferricyanide (99+%, ACS reagent) and potassium ferrocyanide trihydrate (99+%, for analysis) were purchased from Acros Organics. Ultrapure water (18.20 MΩ*cm) and Potassium Chloride (KCl) (99.0% min.) were used for the 1M KCl solution. A model P-2000 laser puller from Sutter Instruments was used to make the dual-barrel electrodes, and a BV-10 Micropipette Beveler from Sutter Instruments was used for polishing the electrodes. All solutions were nebulized with a Hudson RCI 1724 nebulizer bought from Amazon. The flow rate was regulated by an Amvex Medical Flowmeter to 4 L/min. A D-11 dust decoder spectrometer from Durag was used for aerosol size analysis. The distance of the tip of the nozzle to the face of the electrode was ~1 inch.

Aerosol Electroanalysis. A 1:1 solution of 300mM ferricyanide/ferrocyanide was nebulized and directed at the tip of the dual-barrel electrode. A background without any nebulization was taken for the first 30 seconds, after which the nebulizer was turned on for the duration of the experiment. The impacts of the liquid particles on the electrode surface were monitored with amperometric *i*-t traces.

Simulation Parameters

The commercial finite-element software, COMSOL Multiphysics 6.0, was used for simulating cyclic voltammetry in small collector volumes. The simulations were done on a PC equipped with an Intel Xeon Silver 4210R 2.4GHz CPU with 32 GB of RAM. Optical microscopy literature informed the geometry of the droplet in the simulation.

COMSOL MULTIPHYSICS®

Dual-Barrel Electrode with Aerosol Droplet

Report date	Feb 18, 2023, 4:00:25 PM

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1 Global Definitions

Date	Feb 18, 2023, 3:58:57 PM

GLOBAL SETTINGS

Name	Dual-Barrel Electrode with Aerosol Droplet.mph
Path	D:\Dual-Barrel Electrode with Aerosol Droplet.mph
Version	COMSOL Multiphysics 6.0 (Build: 405)
Unit system	SI

USED PRODUCTS

COMSOL Multiphysics
Chemical Reaction Engineering Module

COMPUTER INFORMATION

CPU	Intel64 Family 6 Model 85 Stepping 7, 2 sockets, 20 cores
Operating system	Windows 10

1.1 PARAMETERS

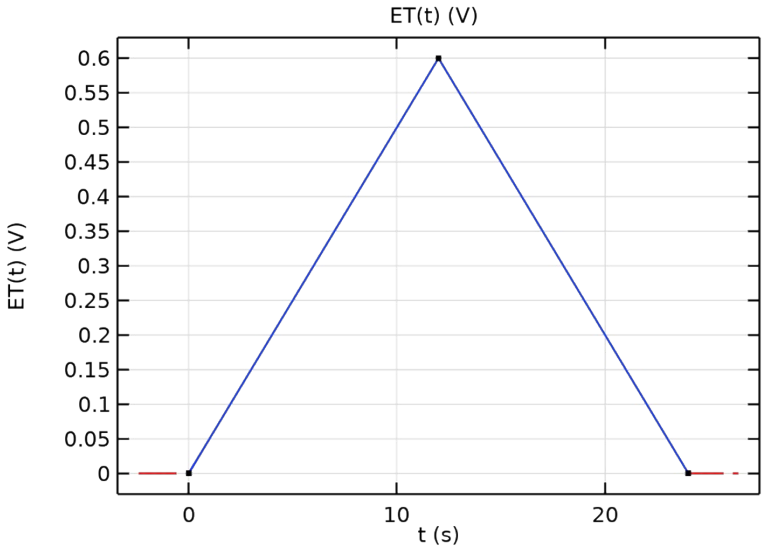
PARAMETERS 1

Name	Expression	Value	Description
alpha	0.5	0.5	Transfer Coefficient
Ei	0	0	Initial Potential
Ef	0.6[V]	0.6 V	Vertex Potential
t	0 [s]	0 s	initial time
Dferro	6.4E-6[cm^2/s]	6.4E−10 m^2/s	Ferrocyanide Dif. Coef.
Dferri	6.4E-6[cm^2/s]	6.4E−10 m^2/s	Ferri Def. Coef.
Eformal	0.3[V]	0.3 V	
v	0.05[V/s]	0.05 V/s	Scan Rate
f	F/((R2)*T)	39.608 1/V	Reduced Faraday's
F	96485 [C/mol]	96485 C/mol	Faraday's Constant
T	293 [K]	293 K	Temperature
R2	8.314[J/K/mol]	8.314 J/(mol·K)	Gas Constant
ts	abs(Ef - Ei)/v	12 s	Scan segment duration
k0	10[cm/s]	0.1 m/s	
cFerro	300[mM]	300 mol/m^3	
cFerri	300[mM]	300 mol/m^3	

1.2 FUNCTIONS

1.2.1 ET(t)

Function names	ET
Function type	Interpolation



ET(t)

UNITS

Function	Unit
ET	V

UNITS

Argument	Unit
t	s

1.3 SHARED PROPERTIES

1.3.1 Default Model Inputs

Tag	cminpt

2 Component 1

Date	Sep 1, 2022, 11:47:56 AM

SETTINGS

Description	Value
Unit system	Same as global system (SI)
Geometry shape function	Automatic

SPATIAL FRAME COORDINATES

First	Second	Third
x	y	z

MATERIAL FRAME COORDINATES

First	Second	Third
X	Y	Z

GEOMETRY FRAME COORDINATES

First	Second	Third
Xg	Yg	Zg

MESH FRAME COORDINATES

First	Second	Third
Xm	Ym	Zm

2.1 DEFINITIONS

2.1.1 Variables

Variables 1

SELECTION

Geometric entity level	Entire model

Name	Expression	Unit	Description
eta	ET(t) - Eformal	V	
current1	F*intop1(tds.ntflux_ox)	A	
current2	F*intop2(tds.ntflux_ox)	A	

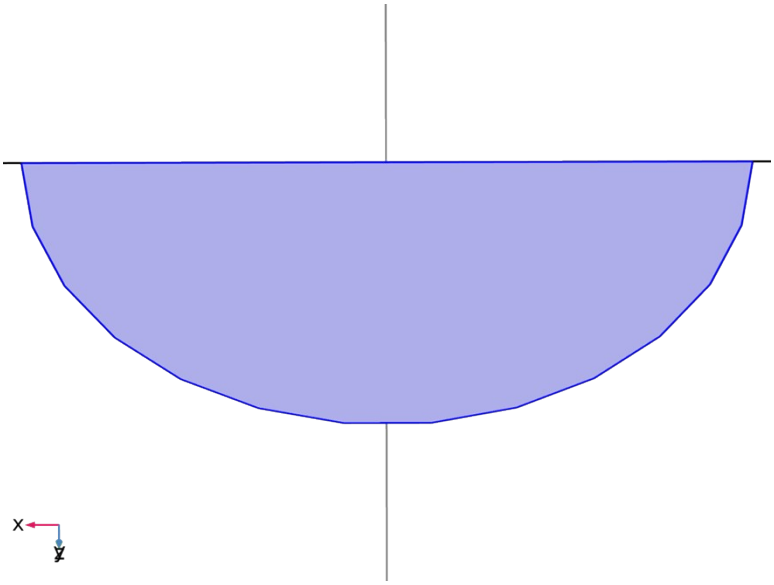
2.1.2 Nonlocal Couplings

Integration 1

Coupling type	Integration
Operator name	intop1

SELECTION

Geometric entity level	Boundary
Selection	Geometry geom1: Dimension 2: Boundary 6



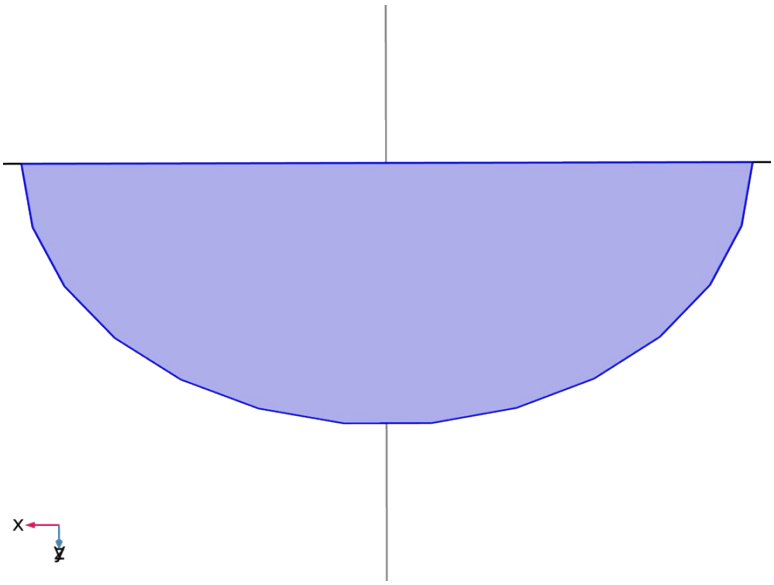
Selection

Integration 2

Coupling type	Integration
Operator name	intop2

SELECTION

Geometric entity level	Boundary
Selection	Geometry geom1: Dimension 2: Boundary 4



Selection

2.1.3 Coordinate Systems

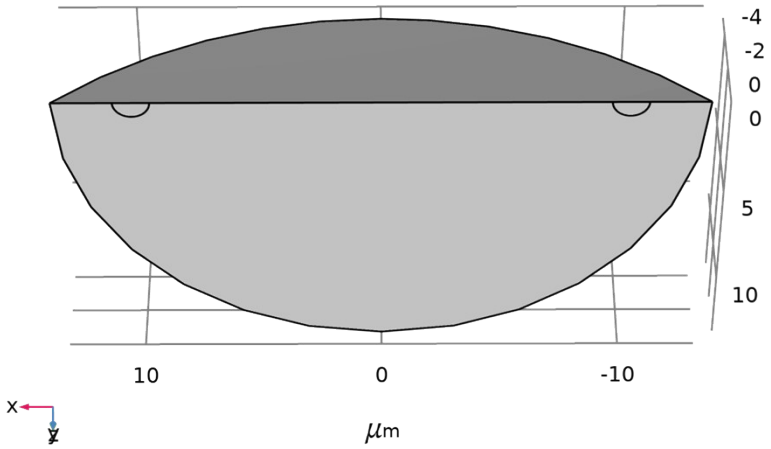
Boundary System 1

Coordinate system type	Boundary system
Tag	sys1

COORDINATE NAMES

First	Second	Third
t1	t2	n

2.2 GEOMETRY 1



Geometry 1

UNITS

Length unit	μm
Angular unit	deg

GEOMETRY STATISTICS

Description	Value
Space dimension	3
Number of domains	1
Number of boundaries	6
Number of edges	12
Number of vertices	8

2.2.1 Sphere 1 (sph1)

POSITION

Description	Value
Position	{0, 0, 15}

AXIS

Description	Value
Axis type	z - axis

SIZE

Description	Value
Radius	20

2.2.2 Block 1 (blk1)

POSITION

Description	Value
Position	{-100, -100, 0}

AXIS

Description	Value
Axis type	z - axis

SIZE AND SHAPE

Description	Value
Width	200
Depth	200
Height	200

2.2.3 Block 2 (blk2)

POSITION

Description	Value
Position	{0, -100, -100}
Base	Center

AXIS

Description	Value
Axis type	z - axis

SIZE AND SHAPE

Description	Value
Width	200
Depth	200
Height	300

2.2.4 Work Plane 1 (wp1)

UNITE OBJECTS

Description	Value
Unite objects	On

Plane Geometry (sequence2D)

Circular Arc 1 (ca1)

SETTINGS

Description	Value
Center	{10, 0}
Radius	0.75
Starting point	{10.75, 0}
Endpoint	{9.25, 0}
Start angle	0
End angle	180

Circular Arc 2 (ca2)

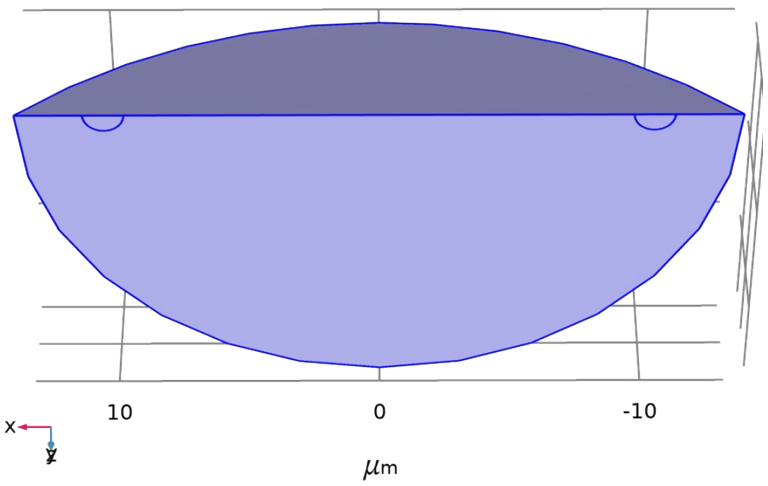
SETTINGS

Description	Value
Center	{-10, 0}
Radius	0.75
Starting point	{-9.25, 0}
Endpoint	{-10.75, 0}
Start angle	0
End angle	180

2.3 TRANSPORT OF DILUTED SPECIES

USED PRODUCTS

COMSOL Multiphysics
Chemical Reaction Engineering Module



Transport of Diluted Species

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 3: Domain 1

EQUATIONS

$$\frac{\partial c_i}{\partial t} + \nabla \cdot \mathbf{J}_i = R_i$$
$$\mathbf{J}_i = -D_i \nabla c_i$$

2.3.1 Interface Settings

Discretization

SETTINGS

Description	Value
Concentration	Linear

SETTINGS

Description	Value
Equation form	Study controlled

Transport Mechanisms

SETTINGS

Description	Value
Convection	Off

Description	Value
Migration in electric field	Off
Mass transfer in porous media	Off

2.3.2 Variables

Name	Expression	Unit	Description	Selection	Details
tds.d	1	1	Out-of-plane geometry extension	Global	
tds.nx	dnx	1	Normal vector, x component	Boundaries 1–6	
tds.ny	dny	1	Normal vector, y component	Boundaries 1–6	
tds.nz	dnz	1	Normal vector, z component	Boundaries 1–6	
tds.nxmesh	dnxmesh	1	Normal vector (mesh), x component	Boundaries 1–6	
tds.nymesh	dnymesh	1	Normal vector (mesh), y component	Boundaries 1–6	
tds.nzmesh	dnzmesh	1	Normal vector (mesh), z component	Boundaries 1–6	
tds.nxc	root.nxc/tds.ncLen	1	Normal vector, x component	Boundaries 1–6	
tds.nyc	root.nyc/tds.ncLen	1	Normal vector, y component	Boundaries 1–6	
tds.nzc	root.nzc/tds.ncLen	1	Normal vector, z component	Boundaries 1–6	
tds.ncLen	sqrt(root.nxc^2+root.nyc^2+root.nzc^2+eps)	1	Help variable	Boundaries 1–6	
tds.R_ox	0	mol/(m³·s)	Total rate expression	Domain 1	+ operation
tds.cP_ox	0	mol/kg	Concentration species adsorbed to the solid	Domain 1	+ operation
tds.cP_ox	0	mol/kg	Concentration species adsorbed to the solid	Boundaries 1–6	+ operation

Name	Expression	Unit	Description	Selection	Details
tds.KP_ox	0	m^3/kg	Adsorption isotherm, first concentration derivative	Domain 1	+ operation
tds.KP_ox	0	m^3/kg	Adsorption isotherm, first concentration derivative	Boundaries 1–6	+ operation
tds.Rads_ox	0	$mol/(m^3 \cdot s)$	Total adsorption rate	Domain 1	+ operation
tds.DiT_ox	0	m^2/s	Turbulent diffusivity	Domain 1	
tds.cVar_ox	ox	mol/m^3	Species	Boundaries 1–6	
tds.R_red	0	$mol/(m^3 \cdot s)$	Total rate expression	Domain 1	+ operation
tds.cP_red	0	mol/kg	Concentration species adsorbed to the solid	Domain 1	+ operation
tds.cP_red	0	mol/kg	Concentration species adsorbed to the solid	Boundaries 1–6	+ operation
tds.KP_red	0	m^3/kg	Adsorption isotherm, first concentration derivative	Domain 1	+ operation
tds.KP_red	0	m^3/kg	Adsorption isotherm, first concentration derivative	Boundaries 1–6	+ operation
tds.Rads_red	0	$mol/(m^3 \cdot s)$	Total adsorption rate	Domain 1	+ operation
tds.DiT_red	0	m^2/s	Turbulent diffusivity	Domain 1	
tds.cVar_red	red	mol/m^3	Species	Boundaries 1–6	
tds.poro	1	1	Porosity	Domain 1	
tds.theta_g	0	1	Gas volume fraction	Domain 1	
tds.theta_l	1	1	Liquid volume fraction	Domain 1	

Name	Expression	Unit	Description	Selection	Details
tds.theta	tds.poro	1	Mobile fluid volume fraction	Domain 1	

2.3.3 Transport Properties 1

Transport Properties 1

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 3: All domains

EQUATIONS

$$\frac{\partial c_i}{\partial t} + \nabla \cdot \mathbf{J}_i = R_i$$

$$\mathbf{J}_i = -D_i \nabla c_i$$

Diffusion

SETTINGS

Description	Value
Source	Material
Material	None
Diffusion coefficient	User defined
Diffusion coefficient	{{Dferro, 0, 0}, {0, Dferro, 0}, {0, 0, Dferro}}
Diffusion coefficient	User defined
Diffusion coefficient	{{Dferri, 0, 0}, {0, Dferri, 0}, {0, 0, Dferri}}

Coordinate System Selection

SETTINGS

Description	Value
Coordinate system	Global coordinate system

Model Input

SETTINGS

Description	Value
Temperature	Common model input

Variables

Name	Expression	Unit	Description	Selection	Details
domflux.oxx	tds.dflux_oxx*tds.d	mol/(m²·s)	Domain flux, x component	Domain 1	
domflux.oxy	tds.dflux_oxy*tds.d	mol/(m²·s)	Domain flux, y component	Domain 1	
domflux.oxz	tds.dflux_oxz*tds.d	mol/(m²·s)	Domain flux, z component	Domain 1	
domflux.redx	tds.dflux_redx*tds.d	mol/(m²·s)	Domain flux, x component	Domain 1	
domflux.redy	tds.dflux_redy*tds.d	mol/(m²·s)	Domain flux, y component	Domain 1	
domflux.redz	tds.dflux_redz*tds.d	mol/(m²·s)	Domain flux, z component	Domain 1	
tds.ndflux_ox	tds.bndFlux_ox	mol/(m²·s)	Normal diffusive flux	Boundaries 1–6	
tds.ntflux_ox	tds.bndFlux_ox	mol/(m²·s)	Normal total flux	Boundaries 1–6	
tds.ndflux_red	tds.bndFlux_red	mol/(m²·s)	Normal diffusive flux	Boundaries 1–6	
tds.ntflux_red	tds.bndFlux_red	mol/(m²·s)	Normal total flux	Boundaries 1–6	
tds.DF_oxxx	Dferro	m²/s	Fluid diffusion coefficient, xx component	Domain 1	
tds.DF_oxyx	0	m²/s	Fluid diffusion coefficient, yx component	Domain 1	
tds.DF_oxzx	0	m²/s	Fluid diffusion coefficient, zx	Domain 1	

Name	Expression	Unit	Description	Selection	Details
			component		
tds.DF_oxxy	0	m^2/s	Fluid diffusion coefficient, xy component	Domain 1	
tds.DF_oxyy	Dferro	m^2/s	Fluid diffusion coefficient, yy component	Domain 1	
tds.DF_oxzy	0	m^2/s	Fluid diffusion coefficient, zy component	Domain 1	
tds.DF_oxxz	0	m^2/s	Fluid diffusion coefficient, xz component	Domain 1	
tds.DF_oxyz	0	m^2/s	Fluid diffusion coefficient, yz component	Domain 1	
tds.DF_oxzz	Dferro	m^2/s	Fluid diffusion coefficient, zz component	Domain 1	
tds.D_oxxx	tds.DF_oxxx+tds.DiT_ox	m^2/s	Diffusion coefficient, xx component	Domain 1	
tds.D_oxyx	tds.DF_oxyx	m^2/s	Diffusion coefficient, yx component	Domain 1	
tds.D_oxzx	tds.DF_oxzx	m^2/s	Diffusion coefficient, zx component	Domain 1	
tds.D_oxxy	tds.DF_oxxy	m^2/s	Diffusion coefficient, xy component	Domain 1	
tds.D_oxyy	tds.DF_oxyy+tds.DiT_ox	m^2/s	Diffusion coefficient, yy component	Domain 1	
tds.D_oxzy	tds.DF_oxzy	m^2/s	Diffusion coefficient, zy component	Domain 1	
tds.D_oxxz	tds.DF_oxxz	m^2/s	Diffusion coefficient, xz component	Domain 1	
tds.D_oxyz	tds.DF_oxyz	m^2/s	Diffusion coefficient, yz	Domain 1	

Name	Expression	Unit	Description	Selection	Details
			component		
tds.D_oxzz	tds.DF_oxzz+tds.DiT_ox	m^2/s	Diffusion coefficient, zz component	Domain 1	
tds.DF_redxx	Dferri	m^2/s	Fluid diffusion coefficient, xx component	Domain 1	
tds.DF_redyx	0	m^2/s	Fluid diffusion coefficient, yx component	Domain 1	
tds.DF_redzx	0	m^2/s	Fluid diffusion coefficient, zx component	Domain 1	
tds.DF_redxy	0	m^2/s	Fluid diffusion coefficient, xy component	Domain 1	
tds.DF_redyy	Dferri	m^2/s	Fluid diffusion coefficient, yy component	Domain 1	
tds.DF_redzy	0	m^2/s	Fluid diffusion coefficient, zy component	Domain 1	
tds.DF_redxz	0	m^2/s	Fluid diffusion coefficient, xz component	Domain 1	
tds.DF_redyz	0	m^2/s	Fluid diffusion coefficient, yz component	Domain 1	
tds.DF_redzz	Dferri	m^2/s	Fluid diffusion coefficient, zz component	Domain 1	
tds.D_redxx	tds.DF_redxx+tds.DiT_red	m^2/s	Diffusion coefficient, xx component	Domain 1	
tds.D_redyx	tds.DF_redyx	m^2/s	Diffusion coefficient, yx component	Domain 1	
tds.D_redzx	tds.DF_redzx	m^2/s	Diffusion coefficient, zx component	Domain 1	
tds.D_redxy	tds.DF_redxy	m^2/s	Diffusion coefficient, xy	Domain 1	

Name	Expression	Unit	Description	Selection	Details
			component		
tds.D_redyy	tds.DF_redyy+tds.DiT_red	m^2/s	Diffusion coefficient, yy component	Domain 1	
tds.D_redzy	tds.DF_redzy	m^2/s	Diffusion coefficient, zy component	Domain 1	
tds.D_redxz	tds.DF_redxz	m^2/s	Diffusion coefficient, xz component	Domain 1	
tds.D_redyz	tds.DF_redyz	m^2/s	Diffusion coefficient, yz component	Domain 1	
tds.D_redzz	tds.DF_redzz+tds.DiT_red	m^2/s	Diffusion coefficient, zz component	Domain 1	
tds.Dav_ox	(tds.D_oxxx+tds.D_oxyy+tds.D_oxzz)/3	m^2/s	Average diffusion coefficient	Domain 1	
tds.Dav_red	(tds.D_redxx+tds.D_redyy+tds.D_redzz)/3	m^2/s	Average diffusion coefficient	Domain 1	
tds.tflux_oxx	tds.dflux_oxx	$mol/(m^2 \cdot s)$	Total flux, x component	Domain 1	+ operation
tds.tflux_oxy	tds.dflux_oxy	$mol/(m^2 \cdot s)$	Total flux, y component	Domain 1	+ operation
tds.tflux_oxz	tds.dflux_oxz	$mol/(m^2 \cdot s)$	Total flux, z component	Domain 1	+ operation
tds.dfluxMag_ox	sqrt(tds.dflux_oxx^2+tds.dflux_oxy^2+tds.dflux_oxz^2)	$mol/(m^2 \cdot s)$	Diffusive flux magnitude	Domain 1	
tds.tfluxMag_ox	sqrt(tds.tflux_oxx^2+tds.tflux_oxy^2+tds.tflux_oxz^2)	$mol/(m^2 \cdot s)$	Total flux magnitude	Domain 1	
tds.dpflux_oxx	0	$mol/(m^2 \cdot s)$	Dispersive flux, x component	Domain 1	
tds.dpflux_oxy	0	$mol/(m^2 \cdot s)$	Dispersive flux, y component	Domain 1	
tds.dpflux_oxz	0	$mol/(m^2 \cdot s)$	Dispersive flux, z component	Domain 1	

Name	Expression	Unit	Description	Selection	Details
tds.tflux_redx	tds.dflux_redx	mol/(m²·s)	Total flux, x component	Domain 1	+ operation
tds.tflux_redy	tds.dflux_redy	mol/(m²·s)	Total flux, y component	Domain 1	+ operation
tds.tflux_redz	tds.dflux_redz	mol/(m²·s)	Total flux, z component	Domain 1	+ operation
tds.dfluxMag_red	sqrt(tds.dflux_redx^2+tds.dflux_redy^2+tds.dflux_redz^2)	mol/(m²·s)	Diffusive flux magnitude	Domain 1	
tds.tfluxMag_red	sqrt(tds.tflux_redx^2+tds.tflux_redy^2+tds.tflux_redz^2)	mol/(m²·s)	Total flux magnitude	Domain 1	
tds.dpflux_redx	0	mol/(m²·s)	Dispersive flux, x component	Domain 1	
tds.dpflux_redy	0	mol/(m²·s)	Dispersive flux, y component	Domain 1	
tds.dpflux_redz	0	mol/(m²·s)	Dispersive flux, z component	Domain 1	
tds.dflux_oxx	-tds.D_oxxx*oxx-tds.D_oxxy*oxy-tds.D_oxxz*oxz	mol/(m²·s)	Diffusive flux, x component	Domain 1	+ operation
tds.dflux_oxy	-tds.D_oxyx*oxx-tds.D_oxyy*oxy-tds.D_oxyz*oxz	mol/(m²·s)	Diffusive flux, y component	Domain 1	+ operation
tds.dflux_oxz	-tds.D_oxzx*oxx-tds.D_oxzy*oxy-tds.D_oxzz*oxz	mol/(m²·s)	Diffusive flux, z component	Domain 1	+ operation
tds.grad_oxx	oxx	mol/m⁴	Concentration gradient, x component	Domain 1	
tds.grad_oxy	oxy	mol/m⁴	Concentration gradient, y component	Domain 1	
tds.grad_oxz	oxz	mol/m⁴	Concentration gradient, z component	Domain 1	
tds.dflux_redx	-tds.D_redxx*redx-tds.D_redxy*redy-tds.D_redxz*redz	mol/(m²·s)	Diffusive flux, x component	Domain 1	+ operation

Name	Expression	Unit	Description	Selection	Details
tds.dflux_redy	-tds.D_redyx*redx-tds.D_redyy*redy-tds.D_redyz*redz	mol/(m²·s)	Diffusive flux, y component	Domain 1	+ operation
tds.dflux_redz	-tds.D_redzx*redx-tds.D_redzy*redy-tds.D_redzz*redz	mol/(m²·s)	Diffusive flux, z component	Domain 1	+ operation
tds.grad_redx	redx	mol/m⁴	Concentration gradient, x component	Domain 1	
tds.grad_redy	redy	mol/m⁴	Concentration gradient, y component	Domain 1	
tds.grad_redz	redz	mol/m⁴	Concentration gradient, z component	Domain 1	
tds.bndFlux_ox	-dflux_spatial(ox)/tds.d	mol/(m²·s)	Boundary flux	Boundaries 1–6	Meta
tds.bndFlux_red	-dflux_spatial(red)/tds.d	mol/(m²·s)	Boundary flux	Boundaries 1–6	Meta
tds.Res_ox	d(ox,t)-tds.R_ox	mol/(m³·s)	Equation residual	Domain 1	
tds.Rlin_ox	0		Linear source term coefficient	Domain 1	
tds.Res_red	d(red,t)-tds.R_red	mol/(m³·s)	Equation residual	Domain 1	
tds.Rlin_red	0		Linear source term coefficient	Domain 1	

Shape functions

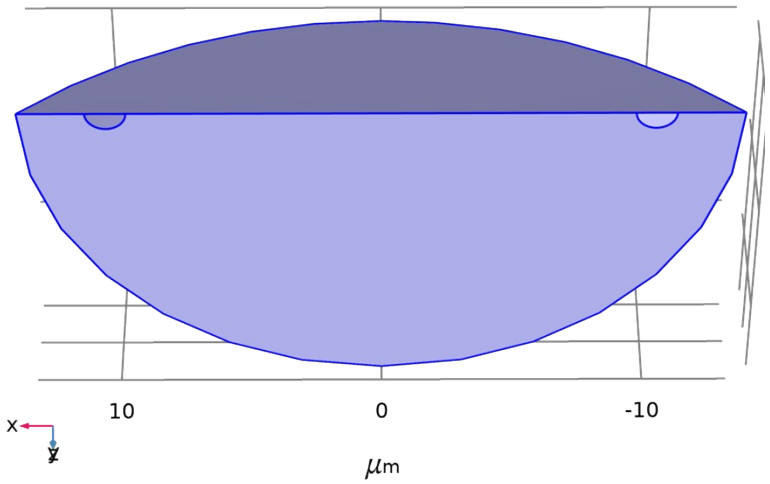
Name	Shape function	Unit	Description	Shape frame	Selection
ox	Lagrange (Linear)	mol/m³	Concentration	Spatial	Domain 1
red	Lagrange (Linear)	mol/m³	Concentration	Spatial	Domain 1

Weak Expressions

Weak expression	Integration order	Integration frame	Selection
(-oxt*test(ox)+tds.dflux_oxx*test(oxx)+tds.dflux_oxy*test(oxy)+tds.dflux_oxz*test(oxz))*tds.d	2	Spatial	Domain 1

Weak expression	Integration order	Integration frame	Selection
(-redt*test(red)+tds.dflux_redx*test(redx)+tds.dflux_redy*test(redy)+tds.dflux_redz*test(redz))*tds.d	2	Spatial	Domain 1
tds.streamline*(isScalingSystemDomain==0)*tds.d	2	Spatial	Domain 1
tds.crosswind*(isScalingSystemDomain==0)*tds.d	4	Spatial	Domain 1

2.3.4 No Flux 1



No Flux 1

SELECTION

Geometric entity level	Boundary
Selection	Geometry geom1: Dimension 2: All boundaries

EQUATIONS

$$-\mathbf{n} \cdot \mathbf{J}_i = 0$$

2.3.5 Initial Values 1

Initial Values 1

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 3: All domains

Initial Values

SETTINGS

Description	Value
Concentration	{cFerro, cFerri}

Variables

Name	Expression	Unit	Description	Selection	Details
tds.c0_ox	cFerro	mol/m³	Concentration	Domain 1	+ operation
tds.c0_red	cFerri	mol/m³	Concentration	Domain 1	+ operation

2.3.6 Flux 1

Flux 1

SELECTION

Geometric entity level	Boundary
Selection	Geometry geom1: Dimension 2: Boundary 4

EQUATIONS

$$-\mathbf{n} \cdot \mathbf{J}_i = \underbrace{J_{0,i}}_{\cdots}$$

Inward Flux

SETTINGS

Description	Value
Flux type	General inward flux
Species ox	On
Species red	On
	{k0*(ox*exp((1 - alpha)*f*eta) -red*exp((-alpha)*f*eta)), -k0*(ox*exp((1 - alpha)*f*eta) -red*exp((-alpha)*f*eta))}

Variables

Name	Expression	Unit	Description	Selection
tds.fl1.nmflow_ox	tds.fl1.int(tds.ntflux_ox)*tds.d	mol/s	Normal molar flow rate	Global
tds.fl1.nmflow_red	tds.fl1.int(tds.ntflux_red)*tds.d	mol/s	Normal molar flow rate	Global

Weak Expressions

Weak expression	Integration order	Integration frame	Selection
k0*(ox*exp((1-alpha)*f*eta)-red*exp(-alpha*f*eta))*test(ox)*tds.d	2	Spatial	Boundary 4
-k0*(ox*exp((1-alpha)*f*eta)-red*exp(-alpha*f*eta))*test(red)*tds.d	2	Spatial	Boundary 4

2.3.7 Flux 2

Flux 2

SELECTION

Geometric entity level	Boundary
Selection	Geometry geom1: Dimension 2: Boundary 6

EQUATIONS

$$-\mathbf{n} \cdot \mathbf{j}_i = j_{0,i}$$

Inward Flux

SETTINGS

Description	Value
Flux type	General inward flux
Species ox	On
Species red	On
	{k0*(red*exp((1 - alpha)*f*eta) -ox*exp((-alpha)*f*eta)), -k0*(red*exp((1 - alpha)*f*eta) -ox*exp((-alpha)*f*eta))}

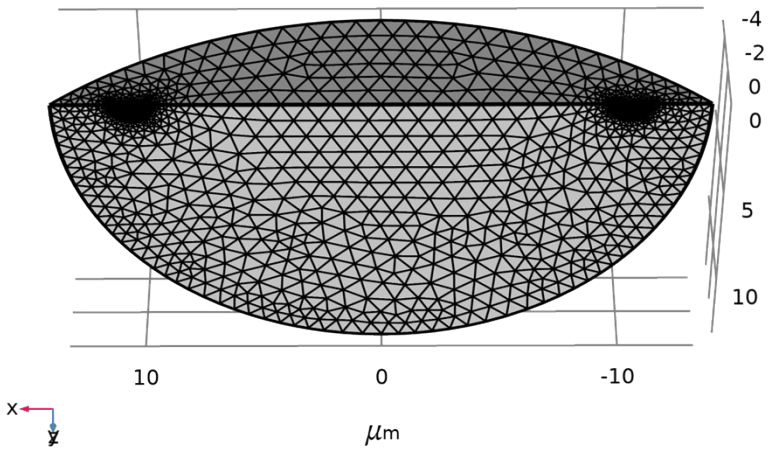
Variables

Name	Expression	Unit	Description	Selection
tds.fl2.nmflow_ox	tds.fl2.int(tds.ntflux_ox)*tds.d	mol/s	Normal molar flow rate	Global
tds.fl2.nmflow_red	tds.fl2.int(tds.ntflux_red)*tds.d	mol/s	Normal molar flow rate	Global

Weak Expressions

Weak expression	Integration order	Integration frame	Selection
k0*(red*exp((1-alpha)*f*eta)-ox*exp(-alpha*f*eta))*test(ox)*tds.d	2	Spatial	Boundary 6
-k0*(red*exp((1-alpha)*f*eta)-ox*exp(-alpha*f*eta))*test(red)*tds.d	2	Spatial	Boundary 6

2.4 MESH 1



Mesh 1

MESH STATISTICS

Description	Value
Status	Complete mesh
Mesh vertices	4017
Tetrahedra	18656
Triangles	3416
Edge elements	233
Vertex elements	8

Description	Value
Number of elements	18656
Minimum element quality	0.2239
Average element quality	0.6541
Element volume ratio	2.2091E-4
Mesh volume	718.3 μm³

2.4.1 Size (size)

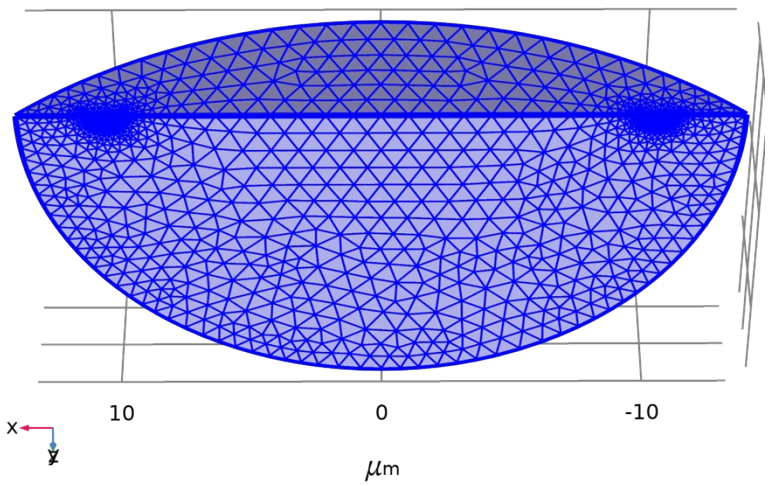
SETTINGS

Description	Value
Minimum element size	0.08
Curvature factor	0.5
Resolution of narrow regions	0.6
Maximum element growth rate	1.45
Predefined size	Fine
Custom element size	Custom

2.4.2 Free Tetrahedral 1 (auto_f1)

SELECTION

Geometric entity level	Domain
Selection	Remaining



Free Tetrahedral 1

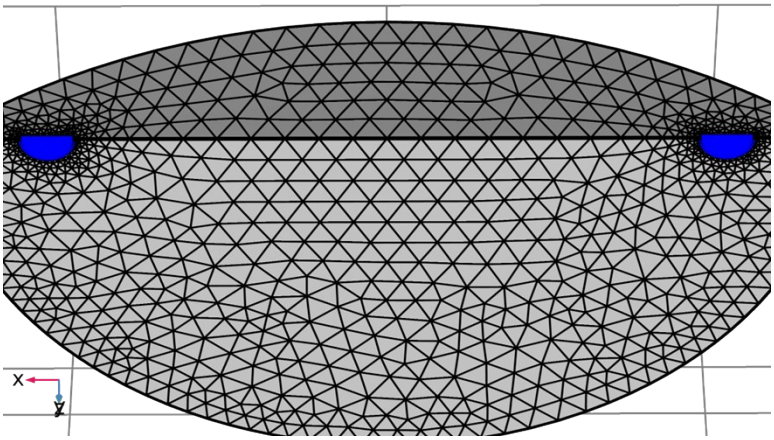
SETTINGS

Description	Value
Avoid inverted curved elements	On
Last build time	0
Built with	COMSOL 6.0.0.405 (win64)|2023 - 02 - 16T14:47:16.196715700

Size 1 (size1)

SELECTION

Geometric entity level	Boundary
Selection	Geometry geom1: Dimension 2: Boundaries 4, 6



Size 1

SETTINGS

Description	Value
Maximum element size	0.1
Minimum element size	0.004
Curvature factor	0.2
Maximum element growth rate	1.3
Predefined size	Extremely fine
Custom element size	Custom

3 Study 1

COMPUTATION INFORMATION

Computation time	39 s

3.1 TIME DEPENDENT

Times	Unit
range(0,0.1,30)	s

STUDY SETTINGS

Description	Value
Include geometric nonlinearity	Off

STUDY SETTINGS

Description	Value
Output times	{0, 0.1, 0.2, 0.30000000000000004, 0.4, 0.5, 0.6000000000000001, 0.7000000000000001, 0.8, 0.9, 1, 1.1, 1.2000000000000002, 1.3, 1.4000000000000001, 1.5, 1.6, 1.7000000000000002, 1.8, 1.9000000000000001, 2, 2.1, 2.2, 2.3000000000000003, 2.4000000000000004, 2.5, 2.6, 2.7, 2.8000000000000003, 2.9000000000000004, 3, 3.1, 3.2, 3.3000000000000003, 3.4000000000000004, 3.5, 3.6, 3.7, 3.8000000000000003, 3.9000000000000004, 4, 4.1000000000000005, 4.2, 4.3, 4.4, 4.5, 4.6000000000000005, 4.7, 4.800000000000001, 4.9, 5, 5.1000000000000005, 5.2, 5.300000000000001, 5.4, 5.5, 5.6000000000000005, 5.7, 5.800000000000001, 5.9, 6, 6.1000000000000005, 6.2, 6.300000000000001, 6.4, 6.5, 6.6000000000000005, 6.7, 6.800000000000001, 6.9, 7, 7.1000000000000005, 7.2, 7.300000000000001, 7.4, 7.5, 7.6000000000000005, 7.7, 7.800000000000001, 7.9, 8, 8.1, 8.200000000000001, 8.3, 8.4, 8.5, 8.6, 8.700000000000001, 8.8, 8.9, 9, 9.1, 9.200000000000001, 9.3, 9.4, 9.5, 9.600000000000001, 9.700000000000001, 9.8, 9.9, 10, 10.100000000000001, 10.200000000000001, 10.3, 10.4, 10.5, 10.600000000000001, 10.700000000000001, 10.8, 10.9, 11, 11.100000000000001, 11.200000000000001, 11.3, 11.4, 11.5, 11.600000000000001, 11.700000000000001, 11.8, 11.9, 12, 12.100000000000001, 12.200000000000001, 12.3, 12.4, 12.5, 12.600000000000001, 12.700000000000001, 12.8, 12.9, 13, 13.100000000000001, 13.200000000000001, 13.3, 13.4, 13.5, 13.600000000000001, 13.700000000000001, 13.8, 13.9, 14, 14.100000000000001, 14.200000000000001, 14.3, 14.4, 14.5, 14.600000000000001, 14.700000000000001, 14.8, 14.9, 15, 15.100000000000001, 15.200000000000001, 15.3, 15.4, 15.5, 15.600000000000001, 15.700000000000001, 15.8, 15.9, 16, 16.1, 16.2, 16.3, 16.400000000000002, 16.5, 16.6, 16.7, 16.8, 16.900000000000002, 17, 17.1, 17.2, 17.3, 17.400000000000002, 17.5, 17.6, 17.7, 17.8, 17.900000000000002, 18, 18.1, 18.2, 18.3, 18.400000000000002, 18.5, 18.6, 18.7, 18.8, 18.900000000000002, 19, 19.1, 19.200000000000003, 19.3, 19.400000000000002, 19.5, 19.6, 19.700000000000003, 19.8, 19.900000000000002, 20, 20.1, 20.200000000000003, 20.3, 20.400000000000002, 20.5, 20.6, 20.700000000000003, 20.8, 20.900000000000002, 21, 21.1, 21.200000000000003, 21.3, 21.400000000000002, 21.5, 21.6,

Description	Value
	21.700000000000003, 21.8, 21.900000000000002, 22, 22.1, 22.200000000000003, 22.3, 22.400000000000002, 22.5, 22.6, 22.700000000000003, 22.8, 22.900000000000002, 23, 23.1, 23.200000000000003, 23.3, 23.400000000000002, 23.5, 23.6, 23.700000000000003, 23.8, 23.900000000000002, 24, 24.1, 24.200000000000003, 24.3, 24.400000000000002, 24.5, 24.6, 24.700000000000003, 24.8, 24.900000000000002, 25, 25.1, 25.200000000000003, 25.3, 25.400000000000002, 25.5, 25.6, 25.700000000000003, 25.8, 25.900000000000002, 26, 26.1, 26.200000000000003, 26.3, 26.400000000000002, 26.5, 26.6, 26.700000000000003, 26.8, 26.900000000000002, 27, 27.1, 27.200000000000003, 27.3, 27.400000000000002, 27.5, 27.6, 27.700000000000003, 27.8, 27.900000000000002, 28, 28.1, 28.200000000000003, 28.3, 28.400000000000002, 28.5, 28.6, 28.700000000000003, 28.8, 28.900000000000002, 29, 29.1, 29.200000000000003, 29.3, 29.400000000000002, 29.5, 29.6, 29.700000000000003, 29.8, 29.900000000000002, 30}

PHYSICS AND VARIABLES SELECTION

Physics interface	Discretization
Transport of Diluted Species (tds)	physics

MESH SELECTION

Geometry	Mesh
Geometry 1 (geom1)	mesh1

3.2 SOLVER CONFIGURATIONS

3.2.1 Solution 1

Compile Equations: Time Dependent (st1)

STUDY AND STEP

Description	Value
Use study	Study 1
Use study step	Time Dependent

LOG

```
<---- Compile Equations: Time Dependent in Study 1/Solution 1 (sol1) -----------
Started at Feb 16, 2023, 2:52:07 PM.
Geometry shape function: Linear Lagrange
Running on 2 x Intel64 Family 6 Model 85 Stepping 7, GenuineIntel.
Using 2 sockets with 20 cores in total on DESKTOP-JPLJHTE.
Available memory: 32.39 GB.
Time: 0 s.
Physical memory: 1.82 GB
Virtual memory: 2.63 GB
Ended at Feb 16, 2023, 2:52:08 PM.
----- Compile Equations: Time Dependent in Study 1/Solution 1 (sol1) ---------->
```

Dependent Variables 1 (v1)

GENERAL

Description	Value
Defined by study step	Time Dependent

RESIDUAL SCALING

Description	Value
Method	Manual

INITIAL VALUE CALCULATION CONSTANTS

Constant name	Initial value source
t	range(0,0.1,30)
timestep	0.03[s]

LOG

```
<---- Dependent Variables 1 in Study 1/Solution 1 (sol1) ----------------------
Started at Feb 16, 2023, 2:52:08 PM.
Solution time: 0 s.
Physical memory: 1.81 GB
Virtual memory: 2.63 GB
Ended at Feb 16, 2023, 2:52:08 PM.
----- Dependent Variables 1 in Study 1/Solution 1 (sol1) ---------------------->
```

Concentration (comp1.ox) (comp1_ox)

GENERAL

Description	Value
Field components	comp1.ox
Internal variables	{comp1.uflux.ox, comp1.dflux.ox, comp1.tds.dt2Inv_ox}

Concentration (comp1.red) (comp1_red)

GENERAL

Description	Value
Field components	comp1.red

Description	Value
Internal variables	{comp1.uflux.red, comp1.dflux.red, comp1.tds.dt2Inv_red}

Time-Dependent Solver 1 (t1)

GENERAL

Description	Value
Defined by study step	Time Dependent
Output times	{0, 0.1, 0.2, 0.30000000000000004, 0.4, 0.5, 0.6000000000000001, 0.7000000000000001, 0.8, 0.9, 1, 1.1, 1.2000000000000002, 1.3, 1.4000000000000001, 1.5, 1.6, 1.7000000000000002, 1.8, 1.9000000000000001, 2, 2.1, 2.2, 2.3000000000000003, 2.4000000000000004, 2.5, 2.6, 2.7, 2.8000000000000003, 2.9000000000000004, 3, 3.1, 3.2, 3.3000000000000003, 3.4000000000000004, 3.5, 3.6, 3.7, 3.8000000000000003, 3.9000000000000004, 4, 4.1000000000000005, 4.2, 4.3, 4.4, 4.5, 4.6000000000000005, 4.7, 4.800000000000001, 4.9, 5, 5.1000000000000005, 5.2, 5.300000000000001, 5.4, 5.5, 5.6000000000000005, 5.7, 5.800000000000001, 5.9, 6, 6.1000000000000005, 6.2, 6.300000000000001, 6.4, 6.5, 6.6000000000000005, 6.7, 6.800000000000001, 6.9, 7, 7.1000000000000005, 7.2, 7.300000000000001, 7.4, 7.5, 7.6000000000000005, 7.7, 7.800000000000001, 7.9, 8, 8.1, 8.200000000000001, 8.3, 8.4, 8.5, 8.6, 8.700000000000001, 8.8, 8.9, 9, 9.1, 9.200000000000001, 9.3, 9.4, 9.5, 9.600000000000001, 9.700000000000001, 9.8, 9.9, 10, 10.100000000000001, 10.200000000000001, 10.3, 10.4, 10.5, 10.600000000000001, 10.700000000000001, 10.8, 10.9, 11, 11.100000000000001, 11.200000000000001, 11.3, 11.4, 11.5, 11.600000000000001, 11.700000000000001, 11.8, 11.9, 12, 12.100000000000001, 12.200000000000001, 12.3, 12.4, 12.5, 12.600000000000001, 12.700000000000001, 12.8, 12.9, 13, 13.100000000000001, 13.200000000000001, 13.3, 13.4, 13.5, 13.600000000000001, 13.700000000000001, 13.8, 13.9, 14, 14.100000000000001, 14.200000000000001, 14.3, 14.4, 14.5, 14.600000000000001, 14.700000000000001, 14.8, 14.9, 15, 15.100000000000001, 15.200000000000001, 15.3, 15.4, 15.5, 15.600000000000001, 15.700000000000001, 15.8, 15.9, 16, 16.1, 16.2, 16.3, 16.400000000000002, 16.5, 16.6, 16.7, 16.8, 16.900000000000002, 17, 17.1, 17.2, 17.3, 17.400000000000002, 17.5, 17.6, 17.7, 17.8, 17.900000000000002, 18, 18.1, 18.2, 18.3, 18.400000000000002, 18.5, 18.6, 18.7, 18.8, 18.900000000000002, 19, 19.1, 19.200000000000003, 19.3, 19.400000000000002, 19.5, 19.6, 19.700000000000003, 19.8, 19.900000000000002, 20, 20.1, 20.200000000000003, 20.3, 20.400000000000002, 20.5, 20.6, 20.700000000000003, 20.8, 20.900000000000002, 21, 21.1, 21.200000000000003, 21.3, 21.400000000000002, 21.5, 21.6, 21.700000000000003, 21.8,

Description	Value
	21.900000000000002, 22, 22.1, 22.200000000000003, 22.3, 22.400000000000002, 22.5, 22.6, 22.700000000000003, 22.8, 22.900000000000002, 23, 23.1, 23.200000000000003, 23.3, 23.400000000000002, 23.5, 23.6, 23.700000000000003, 23.8, 23.900000000000002, 24, 24.1, 24.200000000000003, 24.3, 24.400000000000002, 24.5, 24.6, 24.700000000000003, 24.8, 24.900000000000002, 25, 25.1, 25.200000000000003, 25.3, 25.400000000000002, 25.5, 25.6, 25.700000000000003, 25.8, 25.900000000000002, 26, 26.1, 26.200000000000003, 26.3, 26.400000000000002, 26.5, 26.6, 26.700000000000003, 26.8, 26.900000000000002, 27, 27.1, 27.200000000000003, 27.3, 27.400000000000002, 27.5, 27.6, 27.700000000000003, 27.8, 27.900000000000002, 28, 28.1, 28.200000000000003, 28.3, 28.400000000000002, 28.5, 28.6, 28.700000000000003, 28.8, 28.900000000000002, 29, 29.1, 29.200000000000003, 29.3, 29.400000000000002, 29.5, 29.6, 29.700000000000003, 29.8, 29.900000000000002, 30}
Relative tolerance	0.005

ABSOLUTE TOLERANCE

Description	Value
Tolerance factor	0.001

TIME STEPPING

Description	Value
Maximum BDF order	2
Event tolerance	0.0001
Nonlinear controller	On

LOG

```
<---- Time-Dependent Solver 1 in Study 1/Solution 1 (sol1) ----------------------
Started at Feb 16, 2023, 2:52:08 PM.
Time-dependent solver (BDF)
Number of degrees of freedom solved for: 8034 (plus 41206 internal DOFs).
Nonsymmetric matrix found.
Scales for dependent variables:
Concentration (comp1.ox): 3e+02
Concentration (comp1.red): 3e+02
```

Step	Time	Stepsize		Res	Jac	Sol	Order	Tfail	NLfail	LinErr	LinRes
0	0	-	out	7	3	7			0	2.2e-14	4.9e-15
1	7.8823e-07	7.8823e-07		9	4	9	1	0	0	9.8e-16	5.1e-16
2	1.5765e-06	7.8823e-07		11	5	11	1	0	0	7.7e-16	4.4e-16
3	3.1529e-06	1.5765e-06		13	6	13	2	0	0	8.7e-16	4.1e-16
4	6.3059e-06	3.1529e-06		15	7	15	2	0	0	1.1e-15	9e-16
5	1.2612e-05	6.3059e-06		17	8	17	2	0	0	8.2e-16	5.7e-16
6	1.8918e-05	6.3059e-06		19	9	19	2	0	0	6.9e-16	6.1e-16
7	2.5223e-05	6.3059e-06		21	10	21	2	0	0	6e-16	7e-16
8	3.1529e-05	6.3059e-06		23	11	23	2	0	0	8e-16	1e-15
9	4.4141e-05	1.2612e-05		25	12	25	2	0	0	3.5e-15	9.8e-16
10	5.6753e-05	1.2612e-05		27	13	27	2	0	0	1.8e-15	9.8e-16
11	6.9365e-05	1.2612e-05		29	14	29	2	0	0	1.2e-15	9e-16
12	8.1976e-05	1.2612e-05		31	15	31	2	0	0	1.4e-15	8.3e-16
13	0.0001072	2.5223e-05		33	16	33	2	0	0	5.3e-15	3.7e-15
14	0.00013242	2.5223e-05		35	17	35	2	0	0	8.6e-15	3.4e-15
15	0.00015765	2.5223e-05		37	18	37	2	0	0	5.7e-15	2.4e-15
16	0.00018287	2.5223e-05		39	19	39	2	0	0	9.3e-15	1e-14
17	0.00023332	5.0447e-05		41	20	41	2	0	0	4e-14	5.8e-15
18	0.00028376	5.0447e-05		43	21	43	2	0	0	2.4e-14	8.5e-15
19	0.00033421	5.0447e-05		45	22	45	2	0	0	3.9e-14	4.9e-15
20	0.00038466	5.0447e-05		47	23	47	2	0	0	1.8e-14	4.6e-15
21	0.00048555	0.00010089		49	24	49	2	0	0	2.3e-14	1.3e-14
22	0.00058645	0.00010089		51	25	51	2	0	0	2.2e-14	9.1e-15
23	0.00068734	0.00010089		53	26	53	2	0	0	1.6e-14	1.2e-14
24	0.00078823	0.00010089		55	27	55	2	0	0	1.3e-14	6.7e-15
25	0.00099002	0.00020179		57	28	57	2	0	0	1.4e-14	1.2e-14
26	0.0011918	0.00020179		59	29	59	2	0	0	1e-14	9.4e-15
27	0.0013936	0.00020179		61	30	61	2	0	0	1.6e-14	1.1e-14
28	0.0015954	0.00020179		63	31	63	2	0	0	1.5e-14	7.1e-15
29	0.001999	0.00040358		65	32	65	2	0	0	1.5e-14	9e-15
30	0.0024025	0.00040358		67	33	67	2	0	0	1.7e-14	7.8e-15
31	0.0032097	0.00080715		69	34	69	2	0	0	1e-14	1.1e-14
32	0.0040168	0.00080715		71	35	71	2	0	0	1e-14	1.4e-14
33	0.004824	0.00080715		73	36	73	2	0	0	8.8e-15	1.6e-14
34	0.0056311	0.00080715		75	37	75	2	0	0	1.2e-14	1.4e-14
35	0.0072454	0.0016143		77	38	77	2	0	0	9e-15	8.9e-15
36	0.0088597	0.0016143		79	39	79	2	0	0	6e-15	1.3e-14
37	0.010474	0.0016143		81	40	81	2	0	0	1e-14	1.4e-14
38	0.012088	0.0016143		83	41	83	2	0	0	1.3e-14	1.4e-14
39	0.015317	0.0032286		85	42	85	2	0	0	6.6e-15	2e-14
40	0.018546	0.0032286		87	43	87	2	0	0	6e-15	1.7e-14
41	0.021774	0.0032286		89	44	89	2	0	0	1.6e-14	3.1e-14
42	0.025003	0.0032286		91	45	91	2	0	0	1.1e-14	2e-14
43	0.028231	0.0032286		93	46	93	2	0	0	7.2e-15	1.8e-14
44	0.034689	0.0064572		95	47	95	2	0	0	1.1e-14	3.2e-14
45	0.041146	0.0064572		97	48	97	2	0	0	8.7e-15	3.3e-14

46	0.047603	0.0064572	99	49	99	2	0	0	1.2e-14	3.8e-14
47	0.05406	0.0064572	101	50	101	2	0	0	9.7e-15	2.5e-14
48	0.066975	0.012914	103	51	103	2	0	0	1.1e-14	6.1e-14
49	0.079889	0.012914	105	52	105	2	0	0	5e-15	3.3e-14
50	0.092803	0.012914	107	53	107	2	0	0	6.4e-15	2.9e-14
-	0.1	- out								
51	0.10572	0.012914	109	54	109	2	0	0	9.1e-15	2.6e-14
52	0.11863	0.012914	111	55	111	2	0	0	4.4e-15	3.5e-14
53	0.14446	0.025829	113	56	113	2	0	0	1e-14	4.7e-14
54	0.17029	0.025829	115	57	115	2	0	0	7.5e-15	5.9e-14
55	0.19612	0.025829	117	58	117	2	0	0	4.4e-15	7.1e-14
-	0.2	- out								
56	0.22195	0.025829	119	59	119	2	0	0	8.9e-15	4.9e-14
57	0.27361	0.051658	121	60	121	2	0	0	9.1e-15	9.5e-14
-	0.3	- out								
58	0.37692	0.10332	123	61	123	1	0	0	7.2e-15	1.2e-13
-	0.4	- out								
-	0.5	- out								
59	0.58355	0.20663	125	62	125	1	0	0	4.5e-14	4.6e-14
-	0.6	- out								
-	0.7	- out								
-	0.8	- out								
-	0.9	- out								
60	0.99681	0.41326	127	63	127	1	0	0	5.6e-13	3.4e-14
-	1	- out								
-	1.1	- out								
-	1.2	- out								
-	1.3	- out								
-	1.4	- out								
61	1.4101	0.41326	129	64	129	1	0	0	7.8e-13	2.8e-14
-	1.5	- out								
-	1.6	- out								
-	1.7	- out								
62	1.782	0.37194	131	65	131	1	0	0	4.2e-13	1.5e-14
-	1.8	- out								
-	1.9	- out								
-	2	- out								
63	2.05	0.268	133	66	133	1	0	0	2.3e-13	1.6e-14
-	2.1	- out								
-	2.2	- out								
64	2.2517	0.20165	135	67	135	1	0	0	1.4e-13	1.1e-14
-	2.3	- out								
-	2.4	- out								
65	2.4147	0.16303	137	68	137	1	0	0	1.3e-13	1e-14
-	2.5	- out								
66	2.5552	0.14053	139	69	139	1	0	0	1.3e-13	7e-15
-	2.6	- out								
67	2.6815	0.12629	141	70	141	1	0	0	7.1e-14	7.8e-15
-	2.7	- out								
68	2.7952	0.11366	143	71	143	1	0	0	1.3e-13	8.1e-15
-	2.8	- out								
69	2.8974	0.10229	145	72	145	1	0	0	1.1e-13	9.4e-15
-	2.9	- out								
70	2.9997	0.10229	147	73	147	1	0	0	1.5e-13	2.6e-14
-	3	- out								

71	3.0918	0.092062	149	74	149	1	0	0	7.3e-14	2.2e-14
-	3.1	- out								
72	3.1839	0.092062	151	75	151	1	0	0	1.5e-13	1.6e-14
-	3.2	- out								
73	3.2759	0.092062	153	76	153	1	0	0	1.6e-13	3.4e-14
-	3.3	- out								
-	3.4	- out								
74	3.46	0.18412	155	77	155	2	0	0	3.5e-13	9.9e-14
-	3.5	- out								
-	3.6	- out								
75	3.6442	0.18412	157	78	157	2	0	0	5.3e-14	8.8e-15
-	3.7	- out								
-	3.8	- out								
76	3.8283	0.18412	159	79	159	2	0	0	7.6e-14	7.1e-15
-	3.9	- out								
-	4	- out								
77	4.0124	0.18412	161	80	161	2	0	0	6.4e-13	8e-15
-	4.1	- out								
78	4.1965	0.18412	163	81	163	2	0	0	1.5e-13	8.6e-15
-	4.2	- out								
-	4.3	- out								
79	4.3807	0.18412	165	82	165	2	0	0	1.1e-13	5.2e-15
-	4.4	- out								
-	4.5	- out								
80	4.5648	0.18412	167	83	167	2	0	0	6.5e-13	2.5e-14
-	4.6	- out								
-	4.7	- out								
81	4.7489	0.18412	169	84	169	2	0	0	1.3e-14	2.2e-15
-	4.8	- out								
-	4.9	- out								
82	4.933	0.18412	171	85	171	2	0	0	1.4e-13	6.1e-15
-	5	- out								
-	5.1	- out								
83	5.1172	0.18412	173	86	173	2	0	0	5.1e-14	4.1e-15
-	5.2	- out								
-	5.3	- out								
84	5.3013	0.18412	175	87	175	2	0	0	2.7e-13	1.3e-14
-	5.4	- out								
85	5.4854	0.18412	177	88	177	2	0	0	1.1e-14	2e-15
-	5.5	- out								
-	5.6	- out								
86	5.6695	0.18412	179	89	179	2	0	0	1.5e-14	2e-15
-	5.7	- out								
-	5.8	- out								
87	5.8831	0.2136	183	91	183	2	1	0	9.5e-15	1.6e-15
-	5.9	- out								
-	6	- out								
88	6.0968	0.2136	185	92	185	2	1	0	2.2e-14	3.5e-15
-	6.1	- out								
-	6.2	- out								
89	6.289	0.19224	187	93	187	2	1	0	4.8e-15	1.3e-15
-	6.3	- out								
-	6.4	- out								
90	6.4812	0.19224	189	94	189	1	1	0	1.6e-14	2.5e-15
-	6.5	- out								

-	6.6	- out								
91	6.618	0.13679	191	95	191	1	1	0	2e-14	1.9e-15
-	6.7	- out								
92	6.7276	0.10957	193	96	193	1	1	0	1.7e-13	1.5e-14
-	6.8	- out								
93	6.8252	0.097583	195	97	195	1	1	0	1.4e-14	2.6e-15
-	6.9	- out								
94	6.913	0.087825	197	98	197	1	1	0	1.4e-14	6.6e-15
-	7	- out								
95	7.0008	0.087825	199	99	199	1	1	0	4.4e-13	1.8e-14
96	7.0799	0.079042	201	100	201	1	1	0	5.8e-14	3.1e-15
-	7.1	- out								
97	7.1589	0.079042	203	101	203	1	1	0	7.8e-14	3.4e-15
-	7.2	- out								
98	7.238	0.079042	205	102	205	1	1	0	3e-14	4.6e-15
-	7.3	- out								
99	7.396	0.15808	207	103	207	2	1	0	1.9e-14	1.9e-15
-	7.4	- out								
-	7.5	- out								
100	7.5541	0.15808	209	104	209	2	1	0	9.1e-14	5.5e-15
-	7.6	- out								
-	7.7	- out								
101	7.7122	0.15808	211	105	211	2	1	0	2.5e-14	2.7e-15
-	7.8	- out								
102	7.8703	0.15808	213	106	213	2	1	0	2.2e-13	7.8e-15
-	7.9	- out								
-	8	- out								
103	8.0284	0.15808	215	107	215	2	1	0	1.1e-13	1.7e-15
-	8.1	- out								
104	8.1865	0.15808	217	108	217	2	1	0	5.2e-14	2.4e-15
-	8.2	- out								
-	8.3	- out								
105	8.3445	0.15808	219	109	219	2	1	0	6.1e-14	3.2e-15
-	8.4	- out								
-	8.5	- out								
106	8.5026	0.15808	221	110	221	2	1	0	7.4e-14	1.2e-15
-	8.6	- out								
107	8.6607	0.15808	223	111	223	2	1	0	5e-14	1.2e-15
-	8.7	- out								
-	8.8	- out								
108	8.8188	0.15808	225	112	225	2	1	0	3.8e-14	1.4e-15
-	8.9	- out								
109	8.9769	0.15808	227	113	227	2	1	0	4.4e-14	1.9e-15
-	9	- out								
-	9.1	- out								
110	9.135	0.15808	229	114	229	2	1	0	6.2e-14	1.6e-15
-	9.2	- out								
111	9.2931	0.15808	231	115	231	2	1	0	8.5e-14	1.4e-15
-	9.3	- out								
-	9.4	- out								
112	9.4511	0.15808	233	116	233	2	1	0	1.2e-13	1.6e-15
-	9.5	- out								
-	9.6	- out								
113	9.6092	0.15808	235	117	235	2	1	0	2.2e-13	2.1e-15
-	9.7	- out								

114	9.7673	0.15808	237	118	237	2	1	0	1.3e-13	1.7e-15
-	9.8	- out								
-	9.9	- out								
115	9.9254	0.15808	239	119	239	2	1	0	1.7e-13	2.4e-15
-	10	- out								
116	10.083	0.15808	241	120	241	2	1	0	2.9e-13	2e-15
-	10.1	- out								
-	10.2	- out								
117	10.242	0.15808	243	121	243	2	1	0	1.2e-13	2.2e-15
-	10.3	- out								
118	10.4	0.15808	245	122	245	2	1	0	3.2e-13	4.5e-15
-	10.4	- out								
-	10.5	- out								
119	10.558	0.15808	247	123	247	2	1	0	2.6e-13	3e-15
-	10.6	- out								
-	10.7	- out								
-	10.8	- out								
120	10.874	0.31617	249	124	249	2	1	0	5.2e-13	5.1e-15
-	10.9	- out								
-	11	- out								
-	11.1	- out								
121	11.19	0.31617	251	125	251	2	1	0	1.3e-12	7.1e-15
-	11.2	- out								
-	11.3	- out								
-	11.4	- out								
-	11.5	- out								
122	11.506	0.31617	253	126	253	2	1	0	6.9e-13	8.2e-15
-	11.6	- out								
-	11.7	- out								
-	11.8	- out								
123	11.822	0.31617	255	127	255	2	1	0	8.5e-13	1e-14
-	11.9	- out								
-	12	- out								
-	12.1	- out								
124	12.139	0.31617	257	128	257	2	1	0	2.1e-12	1.8e-14
-	12.2	- out								
-	12.3	- out								
-	12.4	- out								
125	12.455	0.31617	259	129	259	2	1	0	4e-13	2.6e-14
-	12.5	- out								
-	12.6	- out								
-	12.7	- out								
-	12.8	- out								
-	12.9	- out								
-	13	- out								
126	13.087	0.63234	261	130	261	2	1	0	1.4e-12	5.4e-15
-	13.1	- out								
-	13.2	- out								
-	13.3	- out								
-	13.4	- out								
-	13.5	- out								
-	13.6	- out								
127	13.656	0.5691	263	131	263	2	1	0	3.2e-13	4.3e-15
-	13.7	- out								
-	13.8	- out								

-	13.9	- out								
-	14	- out								
128	14.006	0.34951	267	133	267	2	2	0	2.1e-13	2.9e-15
-	14.1	- out								
-	14.2	- out								
-	14.3	- out								
129	14.355	0.34951	269	134	269	2	2	0	1.9e-13	2.3e-15
-	14.4	- out								
-	14.5	- out								
-	14.6	- out								
130	14.667	0.31221	271	135	271	2	2	0	5.7e-14	2.3e-15
-	14.7	- out								
-	14.8	- out								
-	14.9	- out								
131	14.926	0.25888	273	136	273	2	2	0	7e-14	1.6e-15
-	15	- out								
-	15.1	- out								
132	15.157	0.23109	275	137	275	2	2	0	9.1e-14	1.4e-15
-	15.2	- out								
-	15.3	- out								
133	15.365	0.20798	277	138	277	2	2	0	4.5e-14	1.5e-15
-	15.4	- out								
-	15.5	- out								
134	15.553	0.18718	279	139	279	2	2	0	2.8e-14	3.2e-15
-	15.6	- out								
-	15.7	- out								
135	15.74	0.18718	281	140	281	2	2	0	5.8e-14	2.4e-15
-	15.8	- out								
-	15.9	- out								
136	15.927	0.18718	283	141	283	2	2	0	2.5e-13	1.1e-14
-	16	- out								
-	16.1	- out								
137	16.114	0.18718	285	142	285	2	2	0	8.5e-13	1.3e-14
-	16.2	- out								
-	16.3	- out								
138	16.301	0.18718	287	143	287	2	2	0	2.9e-14	1.9e-15
-	16.4	- out								
139	16.488	0.18718	289	144	289	2	2	0	3.5e-13	3.3e-14
-	16.5	- out								
-	16.6	- out								
140	16.676	0.18718	291	145	291	2	2	0	2.5e-14	2.9e-15
-	16.7	- out								
-	16.8	- out								
141	16.863	0.18718	293	146	293	2	2	0	3.4e-14	3.8e-15
-	16.9	- out								
-	17	- out								
142	17.05	0.18718	295	147	295	2	2	0	2.5e-13	4.1e-14
-	17.1	- out								
-	17.2	- out								
143	17.237	0.18718	297	148	297	2	2	0	1e-14	3.3e-15
-	17.3	- out								
-	17.4	- out								
144	17.424	0.18718	299	149	299	2	2	0	1.4e-14	1.3e-15
-	17.5	- out								
-	17.6	- out								

145	17.612	0.18718	301	150	301	2	2	0	7.2e-15	4.8e-15
-	17.7	- out								
-	17.8	- out								
146	17.84	0.22821	305	152	305	2	3	0	1.2e-13	9.3e-15
-	17.9	- out								
-	18	- out								
147	18.068	0.22821	307	153	307	2	3	0	1.4e-14	1.8e-15
-	18.1	- out								
-	18.2	- out								
148	18.273	0.20539	309	154	309	2	3	0	1.2e-14	3.3e-15
-	18.3	- out								
149	18.4	0.12667	313	156	313	1	4	0	5.8e-14	3.2e-15
-	18.4	- out								
-	18.5	- out								
150	18.527	0.12667	315	157	315	1	4	0	9.9e-14	6.9e-15
-	18.6	- out								
151	18.641	0.114	317	158	317	1	4	0	6.6e-14	1e-14
-	18.7	- out								
152	18.743	0.1026	319	159	319	1	4	0	4.2e-14	4.4e-15
-	18.8	- out								
153	18.836	0.092339	321	160	321	1	4	0	2.2e-14	3.4e-15
-	18.9	- out								
154	18.919	0.083105	323	161	323	1	4	0	3.3e-14	3.9e-15
-	19	- out								
155	19.002	0.083105	325	162	325	1	4	0	2.6e-13	2.9e-14
156	19.085	0.083105	327	163	327	1	4	0	1.2e-13	4.1e-15
-	19.1	- out								
-	19.2	- out								
157	19.251	0.16621	329	164	329	2	4	0	1.9e-14	3.2e-15
-	19.3	- out								
-	19.4	- out								
158	19.417	0.16621	331	165	331	2	4	0	4e-14	3.4e-15
-	19.5	- out								
159	19.584	0.16621	333	166	333	2	4	0	5.3e-14	6.6e-15
-	19.6	- out								
-	19.7	- out								
160	19.75	0.16621	335	167	335	2	4	0	1.5e-13	1.3e-14
-	19.8	- out								
-	19.9	- out								
161	19.916	0.16621	337	168	337	2	4	0	1e-13	5.6e-15
-	20	- out								
162	20.082	0.16621	339	169	339	2	4	0	6.3e-14	3.9e-15
-	20.1	- out								
-	20.2	- out								
163	20.248	0.16621	341	170	341	2	4	0	4.7e-14	5.5e-15
-	20.3	- out								
-	20.4	- out								
164	20.415	0.16621	343	171	343	2	4	0	1.4e-13	1.6e-14
-	20.5	- out								
165	20.581	0.16621	345	172	345	2	4	0	5.5e-13	1e-13
-	20.6	- out								
-	20.7	- out								
166	20.747	0.16621	347	173	347	2	4	0	2.3e-13	1.8e-14
-	20.8	- out								
-	20.9	- out								

167	20.913	0.16621	349	174	349	2	4	0	1.6e-13	1.1e-14
-	21	- out								
168	21.079	0.16621	351	175	351	2	4	0	8e-14	1.4e-14
-	21.1	- out								
-	21.2	- out								
169	21.246	0.16621	353	176	353	2	4	0	1.2e-13	9.2e-15
-	21.3	- out								
-	21.4	- out								
170	21.412	0.16621	355	177	355	2	4	0	1.5e-13	9.8e-15
-	21.5	- out								
171	21.578	0.16621	357	178	357	2	4	0	7.8e-14	8.4e-15
-	21.6	- out								
-	21.7	- out								
172	21.744	0.16621	359	179	359	2	4	0	2.5e-13	2.1e-14
-	21.8	- out								
-	21.9	- out								
173	21.91	0.16621	361	180	361	2	4	0	2.7e-13	8.4e-15
-	22	- out								
174	22.077	0.16621	363	181	363	2	4	0	9.8e-14	1.5e-14
-	22.1	- out								
-	22.2	- out								
175	22.243	0.16621	365	182	365	2	4	0	1.8e-13	1.8e-14
-	22.3	- out								
-	22.4	- out								
176	22.409	0.16621	367	183	367	2	4	0	2.1e-13	2e-14
-	22.5	- out								
177	22.575	0.16621	369	184	369	2	4	0	2.5e-13	2.3e-14
-	22.6	- out								
-	22.7	- out								
178	22.742	0.16621	371	185	371	2	4	0	2.9e-13	2.3e-14
-	22.8	- out								
-	22.9	- out								
-	23	- out								
179	23.074	0.33242	373	186	373	2	4	0	7.7e-13	5.6e-14
-	23.1	- out								
-	23.2	- out								
-	23.3	- out								
-	23.4	- out								
180	23.406	0.33242	375	187	375	2	4	0	1.6e-12	3.4e-14
-	23.5	- out								
-	23.6	- out								
-	23.7	- out								
181	23.739	0.33242	377	188	377	2	4	0	1.3e-12	8.9e-14
-	23.8	- out								
-	23.9	- out								
-	24	- out								
182	24.071	0.33242	379	189	379	2	4	0	2.1e-12	9.2e-14
-	24.1	- out								
-	24.2	- out								
-	24.3	- out								
-	24.4	- out								
-	24.5	- out								
-	24.6	- out								
-	24.7	- out								
183	24.736	0.66484	381	190	381	2	4	0	3.3e-12	1.5e-13

-	24.8	- out									
-	24.9	- out									
-	25	- out									
-	25.1	- out									
-	25.2	- out									
-	25.3	- out									
-	25.4	- out									
184	25.401	0.66484	383	191	383	2	4	0	1.4e-12	1e-13	
-	25.5	- out									
-	25.6	- out									
-	25.7	- out									
-	25.8	- out									
-	25.9	- out									
-	26	- out									
-	26.1	- out									
-	26.2	- out									
-	26.3	- out									
-	26.4	- out									
-	26.5	- out									
-	26.6	- out									
-	26.7	- out									
185	26.731	1.3297	385	192	385	1	4	0	1.9e-13	1.5e-13	
-	26.8	- out									
-	26.9	- out									
-	27	- out									
-	27.1	- out									
-	27.2	- out									
-	27.3	- out									
-	27.4	- out									
-	27.5	- out									
-	27.6	- out									
-	27.7	- out									
-	27.8	- out									
-	27.9	- out									
-	28	- out									
-	28.1	- out									
-	28.2	- out									
-	28.3	- out									
-	28.4	- out									
-	28.5	- out									
-	28.6	- out									
-	28.7	- out									
-	28.8	- out									
-	28.9	- out									
-	29	- out									
-	29.1	- out									
-	29.2	- out									
-	29.3	- out									
186	29.39	2.6594	387	193	387	1	4	0	2.1e-12	1.3e-13	
-	29.4	- out									
-	29.5	- out									
-	29.6	- out									
-	29.7	- out									
-	29.8	- out									
-	29.9	- out									

```
    -          30           - out
 187       32.39           3      388  194  388     1     4      0  2.3e-13    1e-13
Time-stepping completed.
Solution time: 39 s.
Physical memory: 1.83 GB
Virtual memory: 2.69 GB
Ended at Feb 16, 2023, 2:52:46 PM.
----- Time-Dependent Solver 1 in Study 1/Solution 1 (sol1) -------------------->
```

Advanced (aDef)

ASSEMBLY SETTINGS

Description	Value
Reuse sparsity pattern	On

Fully Coupled 1 (fc1)

GENERAL

Description	Value
Linear solver	Direct, concentrations (tds)

METHOD AND TERMINATION

Description	Value
Damping factor	0.9
Jacobian update	Once per time step
Maximum number of iterations	8
Stabilization and acceleration	Anderson acceleration
Dimension of iteration space	5
Mixing parameter	0.9
Iteration delay	1

Direct, concentrations (tds) (d1)

GENERAL

Description	Value
Solver	PARDISO
Pivoting perturbation	1.0E-13

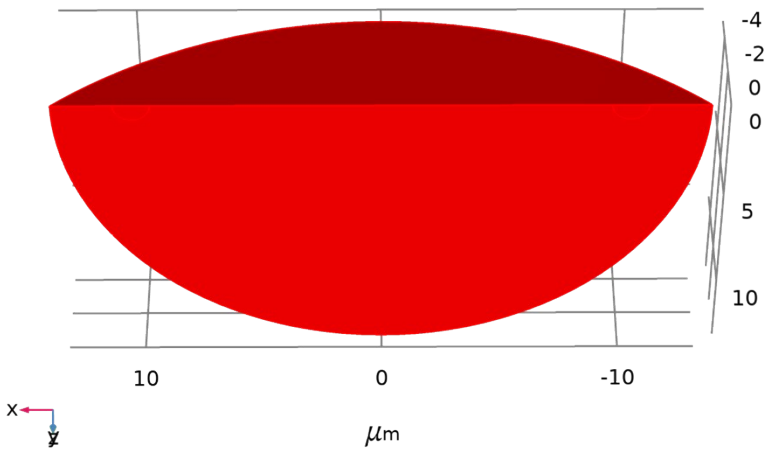
4 Results

4.1 DATASETS

4.1.1 Study 1/Solution 1

SOLUTION

Description	Value
Solution	Solution 1
Component	Component 1 (comp1)



Dataset: Study 1/Solution 1

4.1.2 Cut Plane 1

DATA

Description	Value
Dataset	Study 1/Solution 1

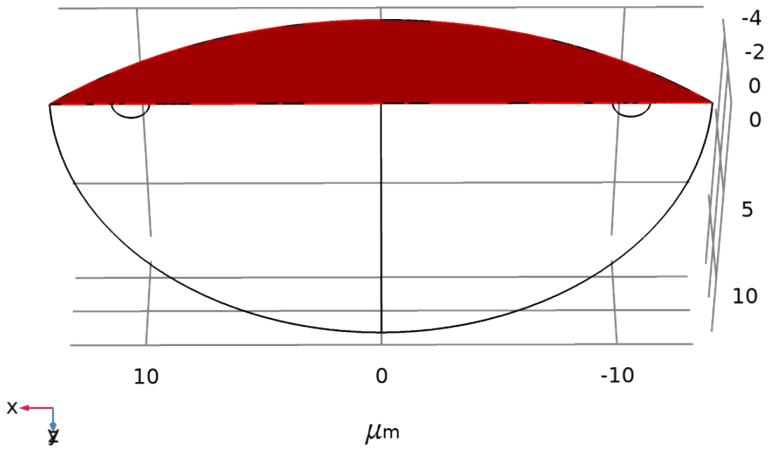
PLANE DATA

Description	Value
Plane type	General
Plane entry method	Three points
Points	{{0, 0, 10}, {0, 0, 0}, {10, 0, 0}}

ADVANCED

Description	Value

Description	Value
Space variables	{cpl1x, cpl1y}
Normal variables	{cpl1nx, cpl1ny, cpl1nz}



Dataset: Cut Plane 1

4.2 DERIVED VALUES

4.2.1 Potential

OUTPUT

Evaluated in	Table 13

DATA

Description	Value
Dataset	Study 1/Solution 1

EXPRESSIONS

Expression	Unit	Description
ET(t)	V	ET(t)

4.2.2 Surface Integration WE

OUTPUT

Evaluated in	Table 13

DATA

Description	Value

Description	Value
Dataset	Study 1/Solution 1

EXPRESSIONS

Expression	Unit	Description
tds.ntflux_ox*F	A	

INTEGRATION SETTINGS

Description	Value
Integration order	4

4.2.3 Surface Integration CE

OUTPUT

Evaluated in	Table 13

DATA

Description	Value
Dataset	Study 1/Solution 1

EXPRESSIONS

Expression	Unit	Description
tds.ntflux_ox*F	A	

INTEGRATION SETTINGS

Description	Value
Integration order	4

4.3 TABLES

4.3.1 0, 16.5 opposite CE, 300, 300

Potential

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
0.0000	0.0000	-9.2566E-8	9.2319E-8
0.50000	0.025000	-1.2890E-8	1.2893E-8
1.0000	0.050000	-1.2615E-8	1.3255E-8
1.5000	0.075000	-1.2307E-8	1.3544E-8
2.0000	0.10000	-1.2774E-8	1.2987E-8
2.5000	0.12500	-1.2845E-8	1.2883E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
3.0000	0.15000	-1.2682E-8	1.2946E-8
3.5000	0.17500	-1.2585E-8	1.2807E-8
4.0000	0.20000	-1.2230E-8	1.2536E-8
4.5000	0.22500	-1.1383E-8	1.1784E-8
5.0000	0.25000	-9.5134E-9	9.8413E-9
5.5000	0.27500	-5.8634E-9	5.7041E-9
6.0000	0.30000	-1.6823E-10	-4.4702E-10
6.5000	0.32500	5.9619E-9	-6.1271E-9
7.0000	0.35000	1.0043E-8	-9.6873E-9
7.5000	0.37500	1.1892E-8	-1.1487E-8
8.0000	0.40000	1.2546E-8	-1.2321E-8
8.5000	0.42500	1.2777E-8	-1.2664E-8
9.0000	0.45000	1.2820E-8	-1.2830E-8
9.5000	0.47500	1.2892E-8	-1.2844E-8
10.000	0.50000	1.2898E-8	-1.2867E-8
10.500	0.52500	1.2886E-8	-1.2888E-8
11.000	0.55000	1.2960E-8	-1.2816E-8
11.500	0.57500	1.2909E-8	-1.2865E-8
12.000	0.60000	1.2883E-8	-1.2918E-8
12.500	0.57500	1.2717E-8	-1.2404E-8
13.000	0.55000	1.2602E-8	-1.3225E-8
13.500	0.52500	1.2303E-8	-1.3500E-8
14.000	0.50000	1.2675E-8	-1.3072E-8
14.500	0.47500	1.2747E-8	-1.2969E-8
15.000	0.45000	1.2772E-8	-1.2864E-8
15.500	0.42500	1.2524E-8	-1.2858E-8
16.000	0.40000	1.2243E-8	-1.2525E-8
16.500	0.37500	1.1544E-8	-1.1652E-8
17.000	0.35000	9.6579E-9	-9.7266E-9
17.500	0.32500	5.8406E-9	-5.7225E-9
18.000	0.30000	2.6685E-10	5.2618E-10
18.500	0.27500	-4.6922E-9	7.1559E-9
19.000	0.25000	-9.4982E-9	1.0136E-8
19.500	0.22500	-1.1847E-8	1.1524E-8
20.000	0.20000	-1.2396E-8	1.2447E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
20.500	0.17500	-1.2755E-8	1.2682E-8
21.000	0.15000	-1.2879E-8	1.2780E-8
21.500	0.12500	-1.2879E-8	1.2856E-8
22.000	0.10000	-1.2884E-8	1.2880E-8
22.500	0.075000	-1.2898E-8	1.2877E-8
23.000	0.050000	-1.2944E-8	1.2831E-8
23.500	0.025000	-1.2876E-8	1.2905E-8
24.000	0.0000	-1.2994E-8	1.3273E-8
24.500	0.0000	-1.2813E-8	1.2326E-8
25.000	0.0000	-1.2881E-8	1.2931E-8
25.500	0.0000	-1.2896E-8	1.2937E-8
26.000	0.0000	-1.2896E-8	1.2919E-8
26.500	0.0000	-1.2896E-8	1.2902E-8
27.000	0.0000	-1.2895E-8	1.2897E-8
27.500	0.0000	-1.2894E-8	1.2894E-8
28.000	0.0000	-1.2893E-8	1.2890E-8
28.500	0.0000	-1.2892E-8	1.2886E-8
29.000	0.0000	-1.2891E-8	1.2883E-8
29.500	0.0000	-1.2891E-8	1.2884E-8
30.000	0.0000	-1.2891E-8	1.2885E-8

4.3.2 0, 16 opposite CE, 300, 300

Potential

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
0.0000	0.0000	-9.1805E-8	9.2882E-8
0.50000	0.025000	-1.6221E-8	1.6336E-8
1.0000	0.050000	-1.6253E-8	1.6249E-8
1.5000	0.075000	-1.6089E-8	1.6439E-8
2.0000	0.10000	-1.5966E-8	1.6531E-8
2.5000	0.12500	-1.6041E-8	1.6394E-8
3.0000	0.15000	-1.6096E-8	1.6230E-8
3.5000	0.17500	-1.6020E-8	1.6018E-8
4.0000	0.20000	-1.5543E-8	1.5700E-8
4.5000	0.22500	-1.4382E-8	1.4821E-8
5.0000	0.25000	-1.2007E-8	1.2370E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
5.5000	0.27500	-7.3502E-9	7.1784E-9
6.0000	0.30000	-5.4790E-10	-8.9576E-10
6.5000	0.32500	7.0664E-9	-8.1519E-9
7.0000	0.35000	1.2459E-8	-1.2426E-8
7.5000	0.37500	1.4956E-8	-1.4534E-8
8.0000	0.40000	1.5838E-8	-1.5529E-8
8.5000	0.42500	1.6144E-8	-1.5943E-8
9.0000	0.45000	1.6240E-8	-1.6114E-8
9.5000	0.47500	1.6265E-8	-1.6187E-8
10.000	0.50000	1.6267E-8	-1.6220E-8
10.500	0.52500	1.6264E-8	-1.6235E-8
11.000	0.55000	1.6305E-8	-1.6194E-8
11.500	0.57500	1.6273E-8	-1.6222E-8
12.000	0.60000	1.6513E-8	-1.7034E-8
12.500	0.57500	1.5834E-8	-1.5550E-8
13.000	0.55000	1.5831E-8	-1.6749E-8
13.500	0.52500	1.6072E-8	-1.6461E-8
14.000	0.50000	1.5929E-8	-1.6535E-8
14.500	0.47500	1.6157E-8	-1.6278E-8
15.000	0.45000	1.6067E-8	-1.6252E-8
15.500	0.42500	1.5947E-8	-1.6079E-8
16.000	0.40000	1.5411E-8	-1.5809E-8
16.500	0.37500	1.4455E-8	-1.4762E-8
17.000	0.35000	1.2221E-8	-1.2203E-8
17.500	0.32500	7.3420E-9	-7.1824E-9
18.000	0.30000	5.2093E-10	8.7710E-10
18.500	0.27500	-7.0982E-9	8.1271E-9
19.000	0.25000	-1.2492E-8	1.2399E-8
19.500	0.22500	-1.4953E-8	1.4537E-8
20.000	0.20000	-1.5829E-8	1.5537E-8
20.500	0.17500	-1.6133E-8	1.5952E-8
21.000	0.15000	-1.6231E-8	1.6122E-8
21.500	0.12500	-1.6258E-8	1.6194E-8
22.000	0.10000	-1.6262E-8	1.6225E-8
22.500	0.075000	-1.6261E-8	1.6239E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
23.000	0.050000	-1.6320E-8	1.6177E-8
23.500	0.025000	-1.6257E-8	1.6244E-8
24.000	0.0000	-1.6446E-8	1.6727E-8
24.500	0.0000	-1.6056E-8	1.5488E-8
25.000	0.0000	-1.6243E-8	1.6303E-8
25.500	0.0000	-1.6268E-8	1.6318E-8
26.000	0.0000	-1.6266E-8	1.6297E-8
26.500	0.0000	-1.6263E-8	1.6277E-8
27.000	0.0000	-1.6261E-8	1.6264E-8
27.500	0.0000	-1.6259E-8	1.6260E-8
28.000	0.0000	-1.6258E-8	1.6256E-8
28.500	0.0000	-1.6256E-8	1.6252E-8
29.000	0.0000	-1.6255E-8	1.6248E-8
29.500	0.0000	-1.6253E-8	1.6244E-8
30.000	0.0000	-1.6253E-8	1.6245E-8

4.3.3 0, 15 opposite CE, 300, 300

Potential

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
0.0000	0.0000	-9.2585E-8	9.1751E-8
0.50000	0.025000	-1.8882E-8	1.8992E-8
1.0000	0.050000	-1.8767E-8	1.9167E-8
1.5000	0.075000	-1.8750E-8	1.9104E-8
2.0000	0.10000	-1.8906E-8	1.8873E-8
2.5000	0.12500	-1.8760E-8	1.8973E-8
3.0000	0.15000	-1.8787E-8	1.8817E-8
3.5000	0.17500	-1.8653E-8	1.8611E-8
4.0000	0.20000	-1.8087E-8	1.8250E-8
4.5000	0.22500	-1.6802E-8	1.7170E-8
5.0000	0.25000	-1.4031E-8	1.4317E-8
5.5000	0.27500	-8.4856E-9	8.3672E-9
6.0000	0.30000	-4.4890E-10	-9.3208E-10
6.5000	0.32500	8.0646E-9	-9.6342E-9
7.0000	0.35000	1.3999E-8	-1.4871E-8
7.5000	0.37500	1.7314E-8	-1.6981E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
8.0000	0.40000	1.8356E-8	-1.8119E-8
8.5000	0.42500	1.8734E-8	-1.8580E-8
9.0000	0.45000	1.8862E-8	-1.8765E-8
9.5000	0.47500	1.8901E-8	-1.8841E-8
10.000	0.50000	1.8911E-8	-1.8874E-8
10.500	0.52500	1.8911E-8	-1.8888E-8
11.000	0.55000	1.8950E-8	-1.8849E-8
11.500	0.57500	1.8916E-8	-1.8881E-8
12.000	0.60000	1.9278E-8	-1.9747E-8
12.500	0.57500	1.8435E-8	-1.8271E-8
13.000	0.55000	1.8554E-8	-1.9340E-8
13.500	0.52500	1.8788E-8	-1.9048E-8
14.000	0.50000	1.8628E-8	-1.9141E-8
14.500	0.47500	1.8885E-8	-1.8849E-8
15.000	0.45000	1.8799E-8	-1.8804E-8
15.500	0.42500	1.8465E-8	-1.8771E-8
16.000	0.40000	1.8169E-8	-1.8181E-8
16.500	0.37500	1.6809E-8	-1.7164E-8
17.000	0.35000	1.4009E-8	-1.4334E-8
17.500	0.32500	8.4492E-9	-8.3974E-9
18.000	0.30000	3.4419E-10	8.5052E-10
18.500	0.27500	-8.0580E-9	9.6388E-9
19.000	0.25000	-1.3897E-8	1.4954E-8
19.500	0.22500	-1.7393E-8	1.6916E-8
20.000	0.20000	-1.8280E-8	1.8182E-8
20.500	0.17500	-1.8695E-8	1.8613E-8
21.000	0.15000	-1.8843E-8	1.8782E-8
21.500	0.12500	-1.8893E-8	1.8849E-8
22.000	0.10000	-1.8907E-8	1.8877E-8
22.500	0.075000	-1.8909E-8	1.8890E-8
23.000	0.050000	-1.8942E-8	1.8855E-8
23.500	0.025000	-1.8925E-8	1.8872E-8
24.000	0.0000	-1.9082E-8	1.9248E-8
24.500	0.0000	-1.8767E-8	1.8571E-8
25.000	0.0000	-1.8913E-8	1.8962E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
25.500	0.0000	-1.8908E-8	1.8921E-8
26.000	0.0000	-1.8906E-8	1.8910E-8
26.500	0.0000	-1.8905E-8	1.8901E-8
27.000	0.0000	-1.8904E-8	1.8895E-8
27.500	0.0000	-1.8904E-8	1.8896E-8
28.000	0.0000	-1.8904E-8	1.8897E-8
28.500	0.0000	-1.8904E-8	1.8898E-8
29.000	0.0000	-1.8904E-8	1.8898E-8
29.500	0.0000	-1.8904E-8	1.8899E-8
30.000	0.0000	-1.8904E-8	1.8900E-8

4.3.4 Table 13

Potential

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
0.0000	0.0000	-8.8731E-8	8.8853E-8
0.10000	0.0050000	-2.0886E-8	2.0888E-8
0.20000	0.010000	-2.0446E-8	2.0447E-8
0.30000	0.015000	-2.0431E-8	2.0441E-8
0.40000	0.020000	-2.0432E-8	2.0454E-8
0.50000	0.025000	-2.0427E-8	2.0479E-8
0.60000	0.030000	-2.0424E-8	2.0472E-8
0.70000	0.035000	-2.0368E-8	2.0626E-8
0.80000	0.040000	-2.0352E-8	2.0658E-8
0.90000	0.045000	-2.0376E-8	2.0585E-8
1.0000	0.050000	-2.0433E-8	2.0435E-8
1.1000	0.055000	-2.0305E-8	2.0665E-8
1.2000	0.060000	-2.0264E-8	2.0730E-8
1.3000	0.065000	-2.0305E-8	2.0651E-8
1.4000	0.070000	-2.0425E-8	2.0444E-8
1.5000	0.075000	-2.0257E-8	2.0673E-8
1.6000	0.080000	-2.0196E-8	2.0751E-8
1.7000	0.085000	-2.0276E-8	2.0634E-8
1.8000	0.090000	-2.0392E-8	2.0467E-8
1.9000	0.095000	-2.0252E-8	2.0633E-8
2.0000	0.10000	-2.0324E-8	2.0538E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
2.1000	0.10500	-2.0327E-8	2.0522E-8
2.2000	0.11000	-2.0323E-8	2.0517E-8
2.3000	0.11500	-2.0328E-8	2.0498E-8
2.4000	0.12000	-2.0380E-8	2.0429E-8
2.5000	0.12500	-2.0315E-8	2.0481E-8
2.6000	0.13000	-2.0315E-8	2.0461E-8
2.7000	0.13500	-2.0342E-8	2.0410E-8
2.8000	0.14000	-2.0362E-8	2.0363E-8
2.9000	0.14500	-2.0352E-8	2.0341E-8
3.0000	0.15000	-2.0341E-8	2.0313E-8
3.1000	0.15500	-2.0291E-8	2.0314E-8
3.2000	0.16000	-2.0236E-8	2.0308E-8
3.3000	0.16500	-2.0242E-8	2.0232E-8
3.4000	0.17000	-2.0165E-8	2.0219E-8
3.5000	0.17500	-2.0115E-8	2.0163E-8
3.6000	0.18000	-2.0032E-8	2.0115E-8
3.7000	0.18500	-1.9954E-8	2.0036E-8
3.8000	0.19000	-1.9875E-8	1.9927E-8
3.9000	0.19500	-1.9722E-8	1.9844E-8
4.0000	0.20000	-1.9652E-8	1.9647E-8
4.1000	0.20500	-1.9393E-8	1.9554E-8
4.2000	0.21000	-1.9314E-8	1.9246E-8
4.3000	0.21500	-1.8929E-8	1.9117E-8
4.4000	0.22000	-1.8742E-8	1.8734E-8
4.5000	0.22500	-1.8277E-8	1.8470E-8
4.6000	0.23000	-1.7932E-8	1.7985E-8
4.7000	0.23500	-1.7367E-8	1.7532E-8
4.8000	0.24000	-1.6806E-8	1.6908E-8
4.9000	0.24500	-1.6107E-8	1.6206E-8
5.0000	0.25000	-1.5277E-8	1.5392E-8
5.1000	0.25500	-1.4385E-8	1.4396E-8
5.2000	0.26000	-1.3253E-8	1.3329E-8
5.3000	0.26500	-1.2080E-8	1.2033E-8
5.4000	0.27000	-1.0661E-8	1.0644E-8
5.5000	0.27500	-9.1140E-9	9.0914E-9

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
5.6000	0.28000	-7.4793E-9	7.3476E-9
5.7000	0.28500	-5.6308E-9	5.5468E-9
5.8000	0.29000	-3.8818E-9	3.4901E-9
5.9000	0.29500	-1.6385E-9	1.6813E-9
6.0000	0.30000	5.3975E-11	-5.9481E-10
6.1000	0.30500	2.5412E-9	-2.2692E-9
6.2000	0.31000	4.1897E-9	-4.4840E-9
6.3000	0.31500	6.1959E-9	-6.2882E-9
6.4000	0.32000	7.0387E-9	-8.7833E-9
6.5000	0.32500	9.5277E-9	-9.8094E-9
6.6000	0.33000	1.0998E-8	-1.1330E-8
6.7000	0.33500	1.2261E-8	-1.2736E-8
6.8000	0.34000	1.3492E-8	-1.3896E-8
6.9000	0.34500	1.4668E-8	-1.4834E-8
7.0000	0.35000	1.5725E-8	-1.5615E-8
7.1000	0.35500	1.6285E-8	-1.6562E-8
7.2000	0.36000	1.6874E-8	-1.7284E-8
7.3000	0.36500	1.7747E-8	-1.7589E-8
7.4000	0.37000	1.8119E-8	-1.8131E-8
7.5000	0.37500	1.8612E-8	-1.8448E-8
7.6000	0.38000	1.8894E-8	-1.8818E-8
7.7000	0.38500	1.9127E-8	-1.9129E-8
7.8000	0.39000	1.9421E-8	-1.9306E-8
7.9000	0.39500	1.9545E-8	-1.9551E-8
8.0000	0.40000	1.9728E-8	-1.9687E-8
8.1000	0.40500	1.9870E-8	-1.9806E-8
8.2000	0.41000	1.9911E-8	-1.9969E-8
8.3000	0.41500	2.0057E-8	-2.0008E-8
8.4000	0.42000	2.0114E-8	-2.0094E-8
8.5000	0.42500	2.0128E-8	-2.0194E-8
8.6000	0.43000	2.0233E-8	-2.0193E-8
8.7000	0.43500	2.0247E-8	-2.0257E-8
8.8000	0.44000	2.0279E-8	-2.0291E-8
8.9000	0.44500	2.0325E-8	-2.0301E-8
9.0000	0.45000	2.0320E-8	-2.0348E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
9.1000	0.45500	2.0358E-8	-2.0349E-8
9.2000	0.46000	2.0373E-8	-2.0364E-8
9.3000	0.46500	2.0362E-8	-2.0398E-8
9.4000	0.47000	2.0398E-8	-2.0385E-8
9.5000	0.47500	2.0398E-8	-2.0400E-8
9.6000	0.48000	2.0396E-8	-2.0415E-8
9.7000	0.48500	2.0417E-8	-2.0407E-8
9.8000	0.49000	2.0411E-8	-2.0421E-8
9.9000	0.49500	2.0419E-8	-2.0421E-8
10.000	0.50000	2.0425E-8	-2.0420E-8
10.100	0.50500	2.0418E-8	-2.0432E-8
10.200	0.51000	2.0429E-8	-2.0426E-8
10.300	0.51500	2.0429E-8	-2.0429E-8
10.400	0.52000	2.0423E-8	-2.0438E-8
10.500	0.52500	2.0434E-8	-2.0429E-8
10.600	0.53000	2.0436E-8	-2.0428E-8
10.700	0.53500	2.0460E-8	-2.0402E-8
10.800	0.54000	2.0460E-8	-2.0404E-8
10.900	0.54500	2.0433E-8	-2.0435E-8
11.000	0.55000	2.0460E-8	-2.0402E-8
11.100	0.55500	2.0463E-8	-2.0399E-8
11.200	0.56000	2.0426E-8	-2.0446E-8
11.300	0.56500	2.0446E-8	-2.0419E-8
11.400	0.57000	2.0452E-8	-2.0410E-8
11.500	0.57500	2.0429E-8	-2.0445E-8
11.600	0.58000	2.0439E-8	-2.0427E-8
11.700	0.58500	2.0446E-8	-2.0416E-8
11.800	0.59000	2.0436E-8	-2.0435E-8
11.900	0.59500	2.0529E-8	-2.0632E-8
12.000	0.60000	2.0736E-8	-2.1056E-8
12.100	0.59500	2.0495E-8	-2.0560E-8
12.200	0.59000	2.0369E-8	-2.0319E-8
12.300	0.58500	2.0342E-8	-2.0275E-8
12.400	0.58000	2.0386E-8	-2.0354E-8
12.500	0.57500	2.0421E-8	-2.0460E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
12.600	0.57000	2.0389E-8	-2.0518E-8
12.700	0.56500	2.0363E-8	-2.0565E-8
12.800	0.56000	2.0351E-8	-2.0588E-8
12.900	0.55500	2.0359E-8	-2.0577E-8
13.000	0.55000	2.0394E-8	-2.0526E-8
13.100	0.54500	2.0435E-8	-2.0461E-8
13.200	0.54000	2.0337E-8	-2.0579E-8
13.300	0.53500	2.0268E-8	-2.0656E-8
13.400	0.53000	2.0243E-8	-2.0678E-8
13.500	0.52500	2.0271E-8	-2.0633E-8
13.600	0.52000	2.0362E-8	-2.0514E-8
13.700	0.51500	2.0400E-8	-2.0457E-8
13.800	0.51000	2.0336E-8	-2.0522E-8
13.900	0.50500	2.0339E-8	-2.0514E-8
14.000	0.50000	2.0428E-8	-2.0414E-8
14.100	0.49500	2.0346E-8	-2.0490E-8
14.200	0.49000	2.0302E-8	-2.0526E-8
14.300	0.48500	2.0348E-8	-2.0470E-8
14.400	0.48000	2.0365E-8	-2.0439E-8
14.500	0.47500	2.0279E-8	-2.0507E-8
14.600	0.47000	2.0300E-8	-2.0469E-8
14.700	0.46500	2.0355E-8	-2.0394E-8
14.800	0.46000	2.0268E-8	-2.0449E-8
14.900	0.45500	2.0319E-8	-2.0371E-8
15.000	0.45000	2.0268E-8	-2.0379E-8
15.100	0.44500	2.0239E-8	-2.0359E-8
15.200	0.44000	2.0245E-8	-2.0297E-8
15.300	0.43500	2.0173E-8	-2.0294E-8
15.400	0.43000	2.0177E-8	-2.0208E-8
15.500	0.42500	2.0092E-8	-2.0183E-8
15.600	0.42000	2.0043E-8	-2.0104E-8
15.700	0.41500	1.9955E-8	-2.0035E-8
15.800	0.41000	1.9849E-8	-1.9949E-8
15.900	0.40500	1.9759E-8	-1.9813E-8
16.000	0.40000	1.9573E-8	-1.9713E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
16.100	0.39500	1.9479E-8	-1.9482E-8
16.200	0.39000	1.9179E-8	-1.9358E-8
16.300	0.38500	1.9076E-8	-1.8996E-8
16.400	0.38000	1.8622E-8	-1.8831E-8
16.500	0.37500	1.8409E-8	-1.8364E-8
16.600	0.37000	1.7840E-8	-1.8059E-8
16.700	0.36500	1.7455E-8	-1.7462E-8
16.800	0.36000	1.6751E-8	-1.6952E-8
16.900	0.35500	1.6136E-8	-1.6183E-8
17.000	0.35000	1.5259E-8	-1.5407E-8
17.100	0.34500	1.4361E-8	-1.4413E-8
17.200	0.34000	1.3257E-8	-1.3326E-8
17.300	0.33500	1.2048E-8	-1.2054E-8
17.400	0.33000	1.0651E-8	-1.0653E-8
17.500	0.32500	9.1530E-9	-9.0595E-9
17.600	0.32000	7.3995E-9	-7.4094E-9
17.700	0.31500	5.7862E-9	-5.4284E-9
17.800	0.31000	3.7974E-9	-3.5517E-9
17.900	0.30500	1.8823E-9	-1.4990E-9
18.000	0.30000	-1.6469E-11	6.2459E-10
18.100	0.29500	-2.3872E-9	2.3855E-9
18.200	0.29000	-4.1240E-9	4.5344E-9
18.300	0.28500	-6.1394E-9	6.3321E-9
18.400	0.28000	-8.1927E-9	7.9123E-9
18.500	0.27500	-9.4315E-9	9.8718E-9
18.600	0.27000	-1.0819E-8	1.1461E-8
18.700	0.26500	-1.2192E-8	1.2787E-8
18.800	0.26000	-1.3450E-8	1.3927E-8
18.900	0.25500	-1.4620E-8	1.4870E-8
19.000	0.25000	-1.5707E-8	1.5628E-8
19.100	0.24500	-1.6510E-8	1.6382E-8
19.200	0.24000	-1.7207E-8	1.7009E-8
19.300	0.23500	-1.7737E-8	1.7585E-8
19.400	0.23000	-1.8165E-8	1.8091E-8
19.500	0.22500	-1.8623E-8	1.8438E-8

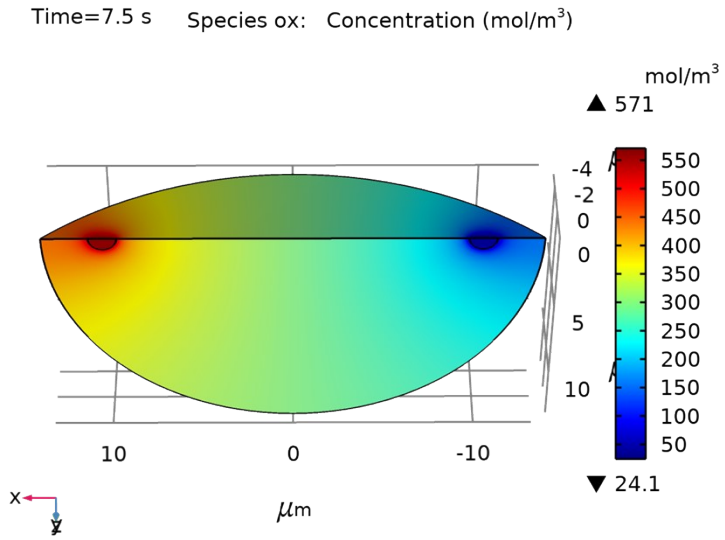
Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
19.600	0.22000	-1.8841E-8	1.8861E-8
19.700	0.21500	-1.9208E-8	1.9063E-8
19.800	0.21000	-1.9394E-8	1.9328E-8
19.900	0.20500	-1.9550E-8	1.9546E-8
20.000	0.20000	-1.9763E-8	1.9657E-8
20.100	0.19500	-1.9809E-8	1.9857E-8
20.200	0.19000	-1.9984E-8	1.9906E-8
20.300	0.18500	-2.0044E-8	2.0019E-8
20.400	0.18000	-2.0092E-8	2.0112E-8
20.500	0.17500	-2.0193E-8	2.0137E-8
20.600	0.17000	-2.0189E-8	2.0232E-8
20.700	0.16500	-2.0274E-8	2.0234E-8
20.800	0.16000	-2.0290E-8	2.0281E-8
20.900	0.15500	-2.0301E-8	2.0323E-8
21.000	0.15000	-2.0351E-8	2.0320E-8
21.100	0.14500	-2.0338E-8	2.0367E-8
21.200	0.14000	-2.0379E-8	2.0358E-8
21.300	0.13500	-2.0383E-8	2.0379E-8
21.400	0.13000	-2.0381E-8	2.0400E-8
21.500	0.12500	-2.0408E-8	2.0391E-8
21.600	0.12000	-2.0396E-8	2.0415E-8
21.700	0.11500	-2.0417E-8	2.0406E-8
21.800	0.11000	-2.0417E-8	2.0415E-8
21.900	0.10500	-2.0413E-8	2.0426E-8
22.000	0.10000	-2.0428E-8	2.0418E-8
22.100	0.095000	-2.0420E-8	2.0431E-8
22.200	0.090000	-2.0430E-8	2.0424E-8
22.300	0.085000	-2.0430E-8	2.0428E-8
22.400	0.080000	-2.0426E-8	2.0435E-8
22.500	0.075000	-2.0434E-8	2.0428E-8
22.600	0.070000	-2.0429E-8	2.0436E-8
22.700	0.065000	-2.0435E-8	2.0431E-8
22.800	0.060000	-2.0441E-8	2.0425E-8
22.900	0.055000	-2.0461E-8	2.0402E-8
23.000	0.050000	-2.0458E-8	2.0405E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
23.100	0.045000	-2.0433E-8	2.0436E-8
23.200	0.040000	-2.0457E-8	2.0404E-8
23.300	0.035000	-2.0462E-8	2.0397E-8
23.400	0.030000	-2.0429E-8	2.0444E-8
23.500	0.025000	-2.0441E-8	2.0424E-8
23.600	0.020000	-2.0450E-8	2.0409E-8
23.700	0.015000	-2.0440E-8	2.0428E-8
23.800	0.010000	-2.0450E-8	2.0467E-8
23.900	0.0050000	-2.0498E-8	2.0533E-8
24.000	0.0000	-2.0562E-8	2.0670E-8
24.100	0.0000	-2.0394E-8	2.0351E-8
24.200	0.0000	-2.0296E-8	2.0099E-8
24.300	0.0000	-2.0236E-8	1.9946E-8
24.400	0.0000	-2.0215E-8	1.9894E-8
24.500	0.0000	-2.0232E-8	1.9941E-8
24.600	0.0000	-2.0288E-8	2.0088E-8
24.700	0.0000	-2.0382E-8	2.0335E-8
24.800	0.0000	-2.0427E-8	2.0451E-8
24.900	0.0000	-2.0430E-8	2.0455E-8
25.000	0.0000	-2.0433E-8	2.0459E-8
25.100	0.0000	-2.0437E-8	2.0463E-8
25.200	0.0000	-2.0442E-8	2.0469E-8
25.300	0.0000	-2.0448E-8	2.0475E-8
25.400	0.0000	-2.0454E-8	2.0481E-8
25.500	0.0000	-2.0453E-8	2.0478E-8
25.600	0.0000	-2.0451E-8	2.0475E-8
25.700	0.0000	-2.0450E-8	2.0471E-8
25.800	0.0000	-2.0449E-8	2.0468E-8
25.900	0.0000	-2.0448E-8	2.0465E-8
26.000	0.0000	-2.0447E-8	2.0462E-8
26.100	0.0000	-2.0445E-8	2.0458E-8
26.200	0.0000	-2.0444E-8	2.0455E-8
26.300	0.0000	-2.0443E-8	2.0452E-8
26.400	0.0000	-2.0442E-8	2.0449E-8
26.500	0.0000	-2.0440E-8	2.0445E-8

Time (s)	ET(t) (V)	tds.ntflux_ox*F (A)	tds.ntflux_ox*F (A)
26.600	0.0000	-2.0439E-8	2.0442E-8
26.700	0.0000	-2.0438E-8	2.0439E-8
26.800	0.0000	-2.0438E-8	2.0438E-8
26.900	0.0000	-2.0438E-8	2.0438E-8
27.000	0.0000	-2.0438E-8	2.0438E-8
27.100	0.0000	-2.0437E-8	2.0438E-8
27.200	0.0000	-2.0437E-8	2.0438E-8
27.300	0.0000	-2.0437E-8	2.0438E-8
27.400	0.0000	-2.0437E-8	2.0437E-8
27.500	0.0000	-2.0437E-8	2.0437E-8
27.600	0.0000	-2.0437E-8	2.0437E-8
27.700	0.0000	-2.0437E-8	2.0437E-8
27.800	0.0000	-2.0437E-8	2.0437E-8
27.900	0.0000	-2.0437E-8	2.0437E-8
28.000	0.0000	-2.0437E-8	2.0437E-8
28.100	0.0000	-2.0437E-8	2.0437E-8
28.200	0.0000	-2.0437E-8	2.0437E-8
28.300	0.0000	-2.0437E-8	2.0437E-8
28.400	0.0000	-2.0437E-8	2.0437E-8
28.500	0.0000	-2.0437E-8	2.0437E-8
28.600	0.0000	-2.0437E-8	2.0437E-8
28.700	0.0000	-2.0437E-8	2.0437E-8
28.800	0.0000	-2.0437E-8	2.0436E-8
28.900	0.0000	-2.0437E-8	2.0436E-8
29.000	0.0000	-2.0437E-8	2.0436E-8
29.100	0.0000	-2.0437E-8	2.0436E-8
29.200	0.0000	-2.0437E-8	2.0436E-8
29.300	0.0000	-2.0437E-8	2.0436E-8
29.400	0.0000	-2.0437E-8	2.0436E-8
29.500	0.0000	-2.0437E-8	2.0436E-8
29.600	0.0000	-2.0437E-8	2.0436E-8
29.700	0.0000	-2.0437E-8	2.0436E-8
29.800	0.0000	-2.0437E-8	2.0436E-8
29.900	0.0000	-2.0437E-8	2.0436E-8
30.000	0.0000	-2.0437E-8	2.0436E-8

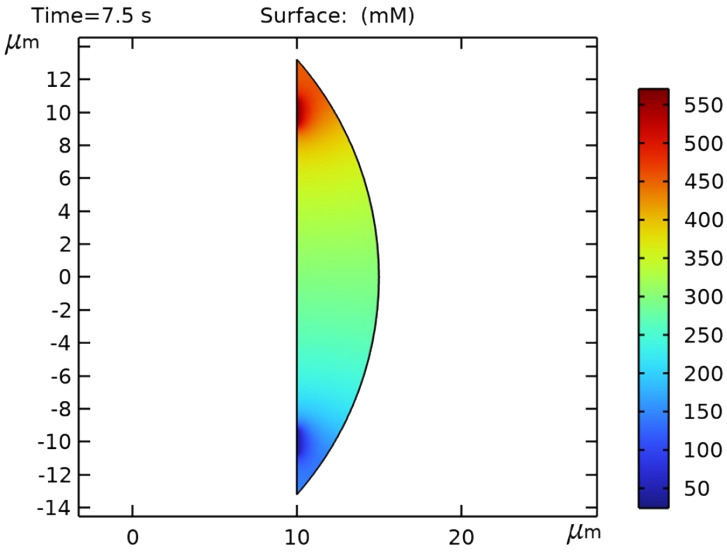
4.4 PLOT GROUPS

4.4.1 Concentration, ox, Surface (tds)



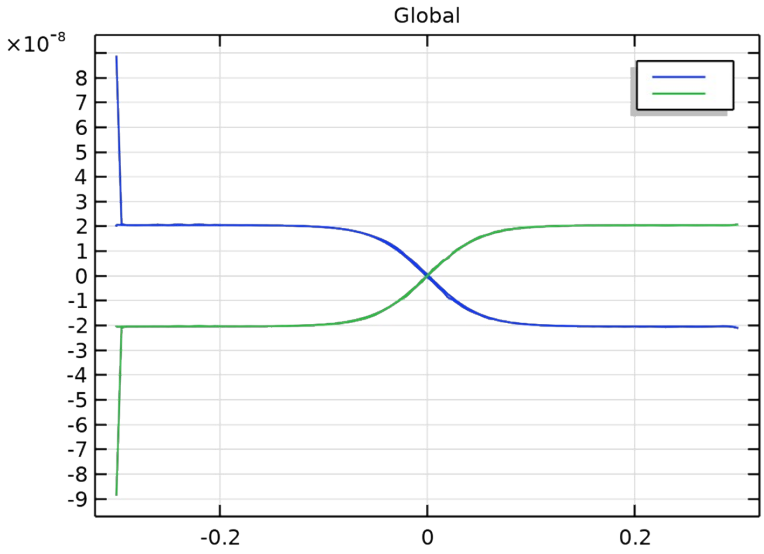
Species ox: Concentration (mol/m³)

4.4.2 2D Plot Group 5



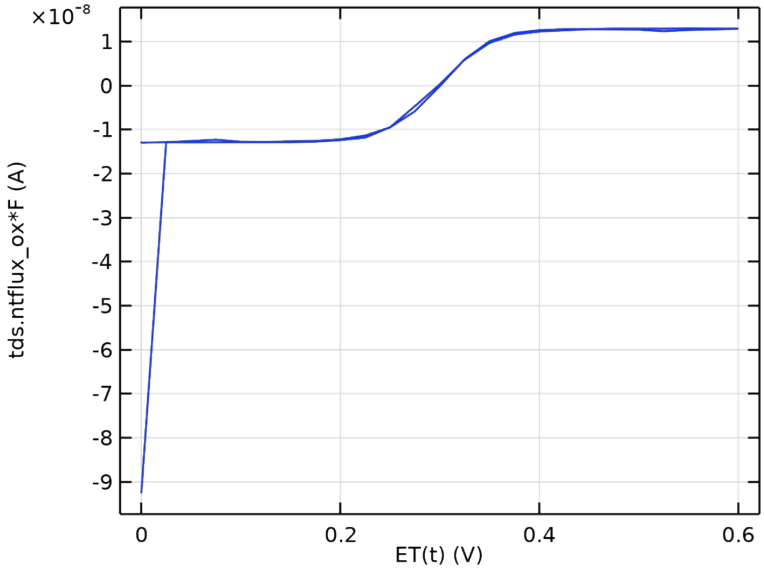
Surface: (mM)

4.4.3 1D Plot Group 6

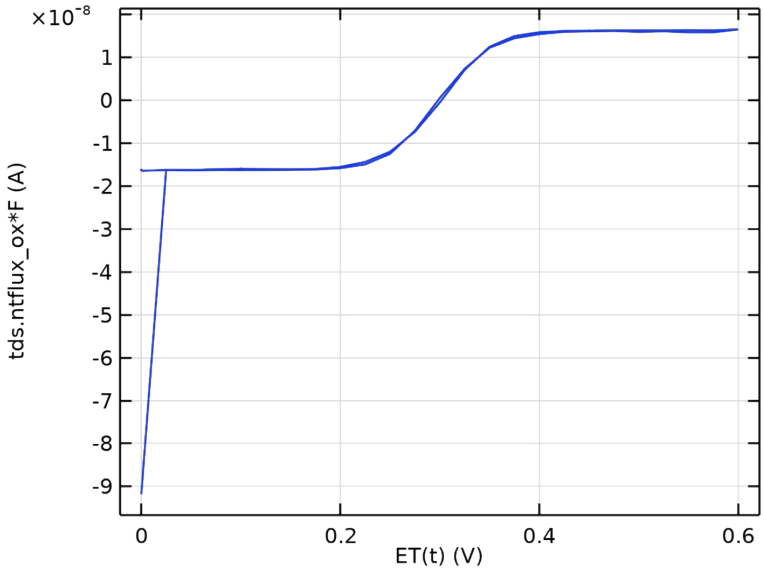


Global

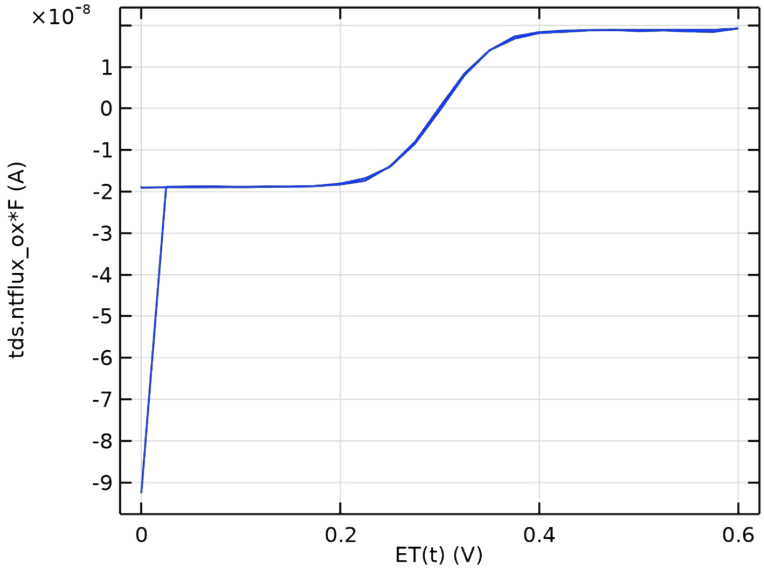
4.4.4 1D Plot Group 15



4.4.5 1D Plot Group 16



4.4.6 1D Plot Group 17



4.4.7 1D Plot Group 18