sl\_C 0.1[1]

sl\_A 0.1[1]

p\_Cg p\_C+rml\_C\*pc\_C

p\_Ag p\_A+rml\_A\*pc\_A

p\_Cl p\_C-rmg\_C\*pc\_C

p\_Al p\_A-rml\_A\*pc\_A

w\_O2\_in\_C 0.228[1]

w\_H2O\_in\_C RH\_C\*mat13.def.pv\_H2O(T)/(pa\_C+p\_C)

w\_N2\_in\_C 0[1]

w\_H2\_in\_C 0[1]

w\_H2O\_in\_A RH\_A\*mat13.def.pv\_H2O(T)/(pa\_A+p\_A)

w\_H2\_in\_A 1-w\_H2O\_in\_A

Cp\_Cg w\_O2g\_C\*mat11.def.cp\_O2g(T)+w\_H2Og\_C\*mat13.def.cp\_H2Og(T)+w\_N2g\_C\*mat12.def.cp\_N2g(T)+w\_H2g\_C\*mat10.def.cp\_H2g(T)

Cp\_Cl mat13.def.cp\_H2Ol(T)

Cp\_C sg\_C\*Cp\_Cg+sl\_C\*Cp\_Cl

Cp\_Ag w\_H2g\_A\*mat10.def.cp\_H2g(T)+w\_H2Og\_A\*mat13.def.cp\_H2Og(T)

Cp\_Al mat13.def.cp\_H2Ol(T)

Cp\_A sg\_A\*Cp\_Ag+sl\_A\*Cp\_Al

lambda\_Cg w\_O2g\_C\*mat11.def.lambda\_O2g(T)+w\_H2Og\_C\*mat13.def.lambda\_H2Og(T)+w\_N2g\_C\*mat12.def.lambda\_N2g(T)+w\_H2g\_C\*mat10.def.lambda\_H2g(T)

lambda\_Cl mat13.def.lambda\_H2Ol(T)

lambda\_C sg\_C\*lambda\_Cg+sl\_C\*lambda\_Cl

lambda\_Ag w\_H2g\_A\*mat10.def.lambda\_H2g(T)+w\_H2Og\_A\*mat13.def.lambda\_H2Og(T)

lambda\_Al mat13.def.lambda\_H2Ol(T)

lambda\_A sg\_A\*lambda\_Ag+sl\_A\*lambda\_Al

D\_O2g\_H2Og\_C sg\_C\*10^(-7)[m^2/s]\*((T/1[K])^1.75)\*((1/(MW\_O2\*1000[g/kg]/1[g/mol])+1/(MW\_H2O\*1000[g/kg]/1[g/mol]))^(1/2))/((pa\_Cg+p\_Cg)/1[atm])/((v\_O2g^(1/3)+v\_H2Og^(1/3))^2)

D\_O2g\_N2g\_C sg\_C\*10^(-7)[m^2/s]\*((T/1[K])^1.75)\*((1/(MW\_O2\*1000[g/kg]/1[g/mol])+1/(MW\_N2\*1000[g/kg]/1[g/mol]))^(1/2))/((pa\_Cg+p\_Cg)/1[atm])/((v\_O2g^(1/3)+v\_N2g^(1/3))^2)

D\_O2g\_H2g\_C sg\_C\*10^(-7)[m^2/s]\*((T/1[K])^1.75)\*((1/(MW\_O2\*1000[g/kg]/1[g/mol])+1/(MW\_H2\*1000[g/kg]/1[g/mol]))^(1/2))/((pa\_Cg+p\_Cg)/1[atm])/((v\_O2g^(1/3)+v\_H2g^(1/3))^2)

D\_H2Og\_N2g\_C sg\_C\*10^(-7)[m^2/s]\*((T/1[K])^1.75)\*((1/(MW\_H2O\*1000[g/kg]/1[g/mol])+1/(MW\_N2\*1000[g/kg]/1[g/mol]))^(1/2))/((pa\_Cg+p\_Cg)/1[atm])/((v\_H2Og^(1/3)+v\_N2g^(1/3))^2)

D\_H2Og\_H2g\_C sg\_C\*10^(-7)[m^2/s]\*((T/1[K])^1.75)\*((1/(MW\_H2O\*1000[g/kg]/1[g/mol])+1/(MW\_H2\*1000[g/kg]/1[g/mol]))^(1/2))/((pa\_Cg+p\_Cg)/1[atm])/((v\_H2Og^(1/3)+v\_H2g^(1/3))^2)

D\_N2g\_H2g\_C sg\_C\*10^(-7)[m^2/s]\*((T/1[K])^1.75)\*((1/(MW\_N2\*1000[g/kg]/1[g/mol])+1/(MW\_H2\*1000[g/kg]/1[g/mol]))^(1/2))/((pa\_Cg+p\_Cg)/1[atm])/((v\_N2g^(1/3)+v\_H2g^(1/3))^2)

D\_H2g\_H2Og\_A sg\_A\*10^(-7)[m^2/s]\*((T/1[K])^1.75)\*((1/(MW\_H2\*1000[g/kg]/1[g/mol])+1/(MW\_H2O\*1000[g/kg]/1[g/mol]))^(1/2))/((pa\_Ag+p\_Ag)/1[atm])/((v\_H2g^(1/3)+v\_H2Og^(1/3))^2)

i0\_C i00\_C\*sg\_C\*c\_O2\_C/c\_O2\_ref

i0\_A i00\_A\*sg\_A\*(c\_H2\_A/c\_H2\_ref)^0.5

i\_A Integral\_RL\_A(DdCS.iv\_per1)/L\_cell^2

D\_M\_H2\_CO 6.5E-10[m^2/s]

n\_M\_H2\_CO\_Old D\_M\_H2\_CO\*Mean\_M\_RL\_A(c\_H2\_A)/H\_M

n\_M\_H2\_CO\_New D\_M\_H2\_CO\*M\_RL\_A(c\_H2\_A)/H\_M

n\_M\_H2\_CO n\_M\_H2\_CO\_New

m\_M\_H2\_CO n\_M\_H2\_CO\*MW\_H2

i\_A\_CO 2\*F\_const\*n\_M\_H2\_CO

D\_H2O\_BD 4.012\*10^(-9)[m^2/s]\*exp(0.0234312[1/K]\*T)

n\_M\_H2O\_BD\_Old D\_H2O\_BD\*(Mean\_M\_RL\_C(c\_H2O\_C)-Mean\_M\_RL\_A(c\_H2O\_A))/H\_M

n\_M\_H2O\_BD\_New D\_H2O\_BD\*(M\_RL\_C(c\_H2O\_C)-M\_RL\_A(c\_H2O\_A))/H\_M

n\_M\_H2O\_BD n\_M\_H2O\_BD\_New

m\_M\_H2O\_BD n\_M\_H2O\_BD\*MW\_H2O

n\_Drag\_EO 2.9\*exp(1029\*(1/333-1[K]/T))

n\_M\_H2O\_EO n\_Drag\_EO\*i\_A/F\_const

m\_M\_H2O\_EO n\_M\_H2O\_EO\*MW\_H2O

rho\_Cg TdSC\_Cg.rho

rho\_Cl mat13.def.rho\_H2Ol(T)

rho\_C sg\_C\*rho\_Cg+sl\_C\*rho\_Cl

rho\_Ag TdSC\_Ag.rho

rho\_Al mat13.def.rho\_H2Ol(T)

rho\_A sg\_A\*rho\_Ag+sl\_A\*rho\_Al

rhok\_C rmg\_C\*rho\_Cg+rml\_C\*rho\_Cl

rhok\_A rmg\_A\*rho\_Ag+rml\_A\*rho\_Al

w\_O2l\_C 0[1]

w\_H2Ol\_C 1[1]

w\_N2l\_C 0[1]

w\_H2l\_C 0[1]

w\_H2l\_A 0[1]

w\_H2Ol\_A 1[1]

w\_O2\_C (sg\_C\*rho\_Cg\*w\_O2g\_C+sl\_C\*rho\_Cl\*w\_O2l\_C)/rho\_C

w\_H2O\_C (sg\_C\*rho\_Cg\*w\_H2Og\_C+sl\_C\*rho\_Cl\*w\_H2Ol\_C)/rho\_C

w\_N2\_C (sg\_C\*rho\_Cg\*w\_N2g\_C+sl\_C\*rho\_Cl\*w\_N2l\_C)/rho\_C

w\_H2\_C (sg\_C\*rho\_Cg\*w\_H2g\_C+sl\_C\*rho\_Cl\*w\_H2l\_C)/rho\_C

w\_H2\_A (sg\_A\*rho\_Ag\*w\_H2g\_A+sl\_A\*rho\_Al\*w\_H2l\_A)/rho\_A

w\_H2O\_A (sg\_A\*rho\_Ag\*w\_H2Og\_A+sl\_A\*rho\_Al\*w\_H2Ol\_A)/rho\_A

mu\_Cg w\_O2g\_C\*mat11.def.mu\_O2g(T)+w\_H2Og\_C\*mat13.def.mu\_H2Og(T)+w\_N2g\_C\*mat12.def.mu\_N2g(T)+w\_H2g\_C\*mat10.def.mu\_H2g(T)

mu\_Cl mat13.def.mu\_H2Ol(T)

mu\_C rho\_C/(krg\_C\*rho\_Cg/mu\_Cg+krl\_C\*rho\_Cl/mu\_Cl)\*1[Pa\*s^2\*m/kg]

mu\_Ag w\_H2g\_A\*mat10.def.mu\_H2g(T)+w\_H2Og\_A\*mat13.def.mu\_H2Og(T)

mu\_Al mat13.def.mu\_H2Ol(T)

mu\_A rho\_A/(krg\_A\*rho\_Ag/mu\_Ag+krl\_A\*rho\_Al/mu\_Al)\*1[Pa\*s^2\*m/kg]

gamma\_O2\_C rho\_C\*(rmg\_C\*w\_O2g\_C+rml\_C\*w\_O2l\_C)/w\_O2\_C

gamma\_H2O\_C rho\_C\*(rmg\_C\*w\_H2Og\_C+rml\_C\*w\_H2Ol\_C)/w\_H2O\_C

gamma\_N2\_C rho\_C\*(rmg\_C\*w\_N2g\_C+rml\_C\*w\_N2l\_C)/w\_N2\_C

gamma\_H2\_C rho\_C\*(rmg\_C\*w\_H2g\_C+rml\_C\*w\_H2l\_C)/w\_H2\_C

gamma\_H2\_A rho\_A\*(rmg\_A\*w\_H2g\_A+rml\_A\*w\_H2l\_A)/w\_H2\_A

gamma\_H2O\_A rho\_A\*(rmg\_A\*w\_H2Og\_A+rml\_A\*w\_H2Ol\_A)/w\_H2O\_A

rmg\_C krg\_C\*mu\_C/mu\_Cg\*rho\_Cg/rho\_C

rml\_C krl\_C\*mu\_C/mu\_Cl\*rho\_Cl/rho\_C

rmg\_A krg\_A\*mu\_A/mu\_Ag\*rho\_Ag/rho\_A

rml\_A krl\_A\*mu\_A/mu\_Al\*rho\_Al/rho\_A

gx 0[m/s^2]

gy g\_const

gz 0[m/s^2]

jl\_Cx if(dom==2,material.epsilon\*(rho\_Cl-rml\_C\*rho\_C)\*u\_C,rmg\_C\*rml\_C\*rho\_C\*material.kappa11/mu\_C\*(d(pc\_C,x)+(rho\_Cl-rho\_Cg)\*gx))

jl\_Cy if(dom==2,material.epsilon\*(rho\_Cl-rml\_C\*rho\_C)\*v\_C,rmg\_C\*rml\_C\*rho\_C\*material.kappa11/mu\_C\*(d(pc\_C,y)+(rho\_Cl-rho\_Cg)\*gy))

jl\_Cz if(dom==2,material.epsilon\*(rho\_Cl-rml\_C\*rho\_C)\*w\_C,rmg\_C\*rml\_C\*rho\_C\*material.kappa11/mu\_C\*(d(pc\_C,z)+(rho\_Cl-rho\_Cg)\*gz))

jl\_Ax if(dom==1,material.epsilon\*(rho\_Al-rml\_A\*rho\_A)\*u\_A,rmg\_A\*rml\_A\*rho\_A\*material.kappa11/mu\_A\*(d(pc\_A,x)+(rho\_Al-rho\_Ag)\*gx))

jl\_Ay if(dom==1,material.epsilon\*(rho\_Al-rml\_A\*rho\_A)\*v\_A,rmg\_A\*rml\_A\*rho\_A\*material.kappa11/mu\_A\*(d(pc\_A,y)+(rho\_Al-rho\_Ag)\*gy))

jl\_Az if(dom==1,material.epsilon\*(rho\_Al-rml\_A\*rho\_A)\*w\_A,rmg\_A\*rml\_A\*rho\_A\*material.kappa11/mu\_A\*(d(pc\_A,z)+(rho\_Al-rho\_Ag)\*gz))

jg\_Cx if(dom==2,material.epsilon\*(rho\_Cg-rmg\_C\*rho\_C)\*u\_C,-jl\_Cx)

jg\_Cy if(dom==2,material.epsilon\*(rho\_Cg-rmg\_C\*rho\_C)\*v\_C,-jl\_Cy)

jg\_Cz if(dom==2,material.epsilon\*(rho\_Cg-rmg\_C\*rho\_C)\*w\_C,-jl\_Cz)

jg\_Ax if(dom==1,material.epsilon\*(rho\_Ag-rmg\_A\*rho\_A)\*u\_A,-jl\_Ax)

jg\_Ay if(dom==1,material.epsilon\*(rho\_Ag-rmg\_A\*rho\_A)\*v\_A,-jl\_Ay)

jg\_Az if(dom==1,material.epsilon\*(rho\_Ag-rmg\_A\*rho\_A)\*w\_A,-jl\_Az)

u\_Cg (jg\_Cx+rmg\_C\*material.epsilon\*rho\_C\*u\_C)/material.epsilon/rho\_Cg

v\_Cg (jg\_Cy+rmg\_C\*material.epsilon\*rho\_C\*v\_C)/material.epsilon/rho\_Cg

w\_Cg (jg\_Cz+rmg\_C\*material.epsilon\*rho\_C\*w\_C)/material.epsilon/rho\_Cg

u\_Ag (jg\_Ax+rmg\_A\*material.epsilon\*rho\_A\*u\_A)/material.epsilon/rho\_Ag

v\_Ag (jg\_Ay+rmg\_A\*material.epsilon\*rho\_A\*v\_A)/material.epsilon/rho\_Ag

w\_Ag (jg\_Az+rmg\_A\*material.epsilon\*rho\_A\*w\_A)/material.epsilon/rho\_Ag

U\_Cg sqrt(u\_Cg^2+v\_Cg^2+w\_Cg^2)

U\_Ag sqrt(u\_Ag^2+v\_Ag^2+w\_Ag^2)

u\_Cl (jl\_Cx+rml\_C\*material.epsilon\*rho\_C\*u\_C)/material.epsilon/rho\_Cl

v\_Cl (jl\_Cy+rml\_C\*material.epsilon\*rho\_C\*v\_C)/material.epsilon/rho\_Cl

w\_Cl (jl\_Cz+rml\_C\*material.epsilon\*rho\_C\*w\_C)/material.epsilon/rho\_Cl

u\_Al (jl\_Ax+rml\_A\*material.epsilon\*rho\_A\*u\_A)/material.epsilon/rho\_Al

v\_Al (jl\_Ay+rml\_A\*material.epsilon\*rho\_A\*v\_A)/material.epsilon/rho\_Al

w\_Al (jl\_Az+rml\_A\*material.epsilon\*rho\_A\*w\_A)/material.epsilon/rho\_Al

U\_Cl sqrt(u\_Cl^2+v\_Cl^2+w\_Cl^2)

U\_Al sqrt(u\_Al^2+v\_Al^2+w\_Al^2)

krg\_C sg\_C^3

krl\_C sl\_C^3

krg\_A sg\_A^3

krl\_A sl\_A^3

Js\_C if(thetac\_C<pi/2[rad],1.417\*sg\_C-2.120\*sg\_C^2+1.263\*sg\_C^3,1.417\*sl\_C-2.120\*sl\_C^2+1.263\*sl\_C^3)

Js\_A if(thetac\_A<pi/2[rad],1.417\*sg\_A-2.120\*sg\_A^2+1.263\*sg\_A^3,1.417\*sl\_A-2.120\*sl\_A^2+1.263\*sl\_A^3)

pc\_C if(dom==2,0,0.0625[N/m]\*cos(thetac\_C)\*((material.epsilon/FLeiMP\_C.kappaxx)^(1/2))\*Js\_C)

pc\_A if(dom==1,0,0.0625[N/m]\*cos(thetac\_A)\*((material.epsilon/FLeiMP\_A.kappaxx)^(1/2))\*Js\_A)

rhov\_C MW\_H2O\*mat13.def.pv\_H2O(T)/R\_const/T

rhov\_A MW\_H2O\*mat13.def.pv\_H2O(T)/R\_const/T

wsat\_H2Og\_C rhov\_C/rho\_Cg

wsat\_H2Ol\_C 1[1]

wsat\_H2Og\_A rhov\_A/rho\_Ag

wsat\_H2Ol\_A 1[1]

gammap\_C (rho\_Cg\*rmg\_C+rho\_Cl\*rml\_C)/rho\_C

gammap\_A (rho\_Ag\*rmg\_A+rho\_Al\*rml\_A)/rho\_C

c\_O2\_C TdSC\_Cg.c\_w\_O2g\_C

c\_H2O\_C TdSC\_Cg.c\_w\_H2Og\_C+sl\_C\*mat13.def.rho\_H2Ol(T)/MW\_H2O

c\_H2\_A TdSC\_Ag.c\_w\_H2g\_A

c\_H2O\_A TdSC\_Ag.c\_w\_H2Og\_A+sl\_A\*mat13.def.rho\_H2Ol(T)/MW\_H2O

sg\_C 1-sl\_C

sg\_A 1-sl\_A

da\_C material.epsilon\*rho\_Cl\*w\_H2Ol\_C

da\_A material.epsilon\*rho\_Al\*w\_H2Ol\_A

c\_C if(dom==2,0,-rmg\_C\*rml\_C\*material.kappa11\*rho\_C/mu\_C\*d(pc\_C,sl\_C))

c\_A if(dom==1,0,-rmg\_A\*rml\_A\*material.kappa11\*rho\_A/mu\_A\*d(pc\_A,sl\_A))

gammaa\_Cx if(dom==2,0,rmg\_C\*rml\_C\*material.kappa11\*rho\_C/mu\_C\*(rho\_Cl-rho\_Cg)\*gx+rho\_Cl\*w\_H2Ol\_C\*u\_Cl)

gammaa\_Cy if(dom==2,0,rmg\_C\*rml\_C\*material.kappa11\*rho\_C/mu\_C\*(rho\_Cl-rho\_Cg)\*gy+rho\_Cl\*w\_H2Ol\_C\*v\_Cl)

gammaa\_Cz if(dom==2,0,rmg\_C\*rml\_C\*material.kappa11\*rho\_C/mu\_C\*(rho\_Cl-rho\_Cg)\*gz+rho\_Cl\*w\_H2Ol\_C\*w\_Cl)

gammaa\_Ax if(dom==1,0,rmg\_A\*rml\_A\*material.kappa11\*rho\_A/mu\_A\*(rho\_Al-rho\_Ag)\*gx+rho\_Al\*w\_H2Ol\_A\*u\_Al)

gammaa\_Ay if(dom==1,0,rmg\_A\*rml\_A\*material.kappa11\*rho\_A/mu\_A\*(rho\_Al-rho\_Ag)\*gy+rho\_Al\*w\_H2Ol\_A\*v\_Al)

gammaa\_Az if(dom==1,0,rmg\_A\*rml\_A\*material.kappa11\*rho\_A/mu\_A\*(rho\_Al-rho\_Ag)\*gz+rho\_Al\*w\_H2Ol\_A\*w\_Al)

s\_in\_C rho\_Cg\*(w\_H2O\_C-MW\_H2O\*mat13.def.psat\_H2O(T)/R\_const/rho\_Cg/T)/(rho\_Cl\*(1-w\_H2O\_C)+rho\_Cg\*(w\_H2O\_C-MW\_H2O\*mat13.def.psat\_H2O(T)/R\_const/rho\_Cg/T))

s\_in\_A rho\_Ag\*(w\_H2O\_A-MW\_H2O\*mat13.def.psat\_H2O(T)/R\_const/rho\_Ag/T)/(rho\_Al\*(1-w\_H2O\_A)+rho\_Ag\*(w\_H2O\_A-MW\_H2O\*mat13.def.psat\_H2O(T)/R\_const/rho\_Ag/T))

Dc\_C if(dom==2,0,-rmg\_C\*rml\_C\*material.kappa11/mu\_C\*d(pc\_C,sl\_C))

Dc\_A if(dom==1,0,-rmg\_A\*rml\_A\*material.kappa11/mu\_A\*d(pc\_A,sl\_A))

R\_H2Ol\_C if(w\_H2O\_C\*(pa\_C+p\_C)>mat13.def.psat\_H2O(T),100[s^-1]\*material.epsilon\*sg\_C\*(w\_H2O\_C\*(pa\_C+p\_C)-mat13.def.psat\_H2O(T))\*MW\_H2O/R\_const/T,100[s^-1]\*material.epsilon\*sl\_C\*(w\_H2O\_C\*(pa\_C+p\_C)-mat13.def.psat\_H2O(T))\*MW\_H2O/R\_const/T)

R\_H2Ol\_A if(w\_H2O\_A\*(pa\_A+p\_A)>mat13.def.psat\_H2O(T),100[s^-1]\*material.epsilon\*sg\_A\*(w\_H2O\_A\*(pa\_A+p\_A)-mat13.def.psat\_H2O(T))\*MW\_H2O/R\_const/T,100[s^-1]\*material.epsilon\*sl\_A\*(w\_H2O\_A\*(pa\_A+p\_A)-mat13.def.psat\_H2O(T))\*MW\_H2O/R\_const/T)

R\_H2Og\_C -R\_H2Ol\_C

R\_H2Og\_A -R\_H2Ol\_A

Model geometry:



 Physics:

