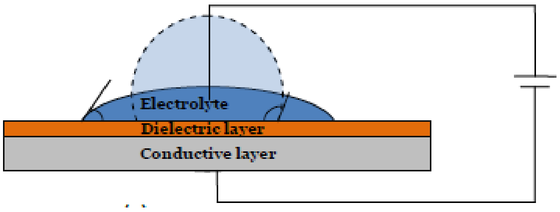
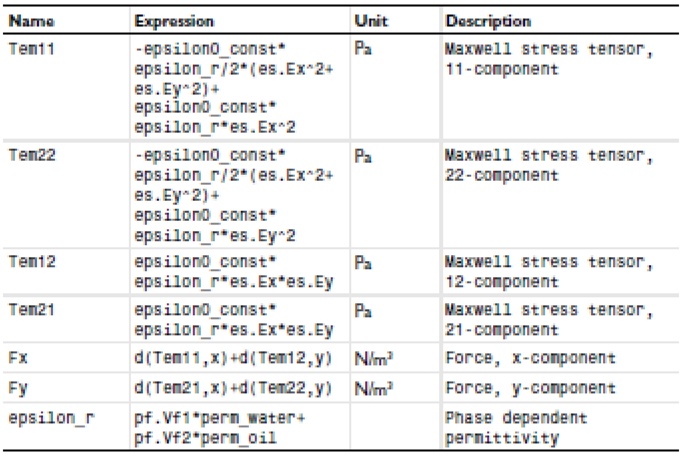
Here I Explain a bit more our objective and the results that we are obtaining:

When a tension is applied on the water the contact angle should decrease in the following way:

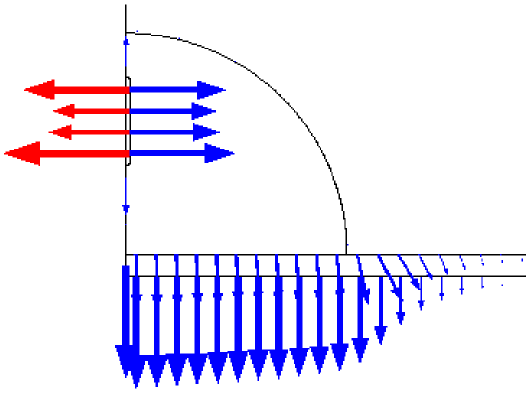


We are using the same method than in the “Separation Through Electrocoalescence” example provided by COMSOL. The method consists on using the Maxwell stress tensor to connect the ES module and the Two-phase flow module. The resultant force Fx and Fy (or r and z in our case) is applied over the fluids with a “Volume force” boundary.

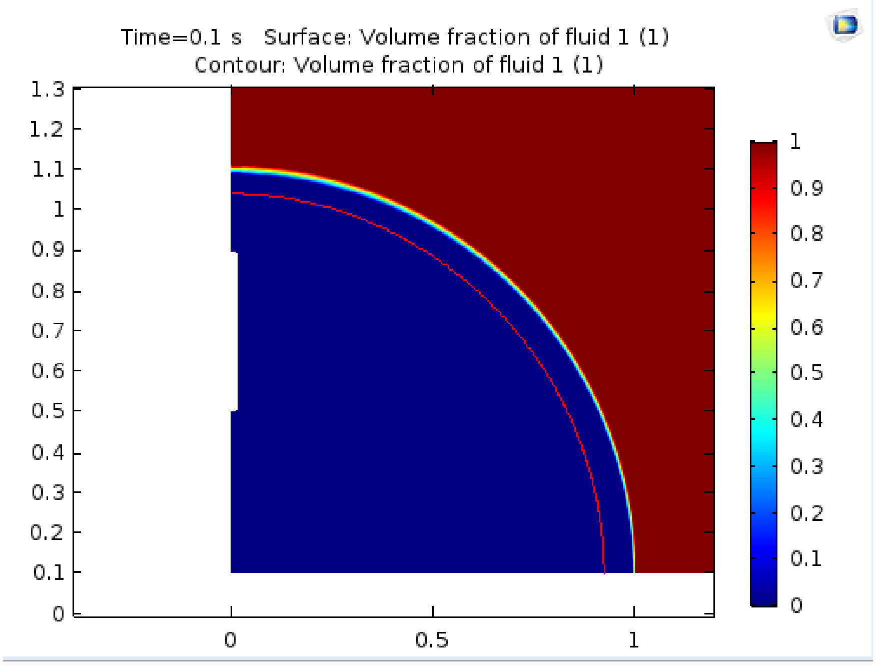


Name	Expression	Unit	Description
Tem11	-epsilon0_const*epsilon_r/2*(es.Ex^2+es.Ey^2)+epsilon0_const*epsilon_r*es.Ex^2	Pa	Maxwell stress tensor, 11-component
Tem22	-epsilon0_const*epsilon_r/2*(es.Ex^2+es.Ey^2)+epsilon0_const*epsilon_r*es.Ey^2	Pa	Maxwell stress tensor, 22-component
Tem12	epsilon0_const*epsilon_r*es.Ex*es.Ey	Pa	Maxwell stress tensor, 12-component
Tem21	epsilon0_const*epsilon_r*es.Ex*es.Ey	Pa	Maxwell stress tensor, 21-component
Fx	d(Tem11,x)+d(Tem12,y)	N/m³	Force, x-component
Fy	d(Tem21,x)+d(Tem22,y)	N/m³	Force, y-component
epsilon_r	pf.Vf1*perm_water+pf.Vf2*perm_oil		Phase dependent permittivity

We are obtaining the opposite behavior. The resultant force (red arrows) is inverted no matter how we apply the voltage. The electric field (blue arrows) is correct.



In the following graph the interface (red line) is seen after 0.1 s of applying 200 V (the drop is contracting).


Time=0.1 s Surface: Volume fraction of fluid 1 (1)
Contour: Volume fraction of fluid 1 (1)
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.5
1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0