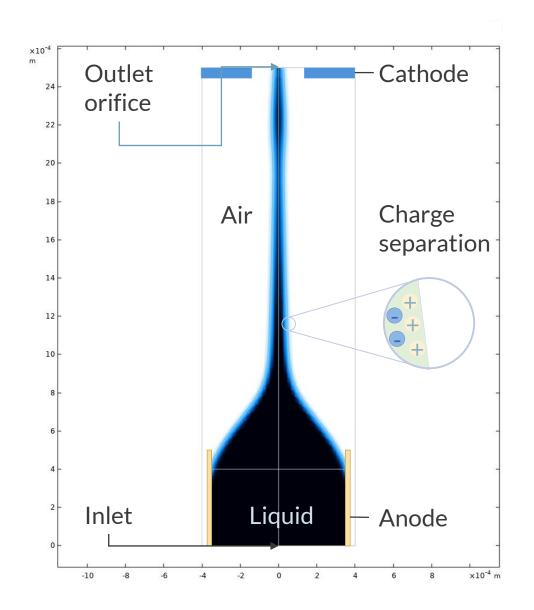
Taylor Cone



Model Definition

- Water-air interface
- Applied electric field over anode and cathode
- Gravity
- Axi-symmetry



Physics Interfaces

- Laminar Flow
 - Volume force from electric field
- Level Set
- Electrostatics
- Multiphysics couplings:
 - Two-Phase Flow

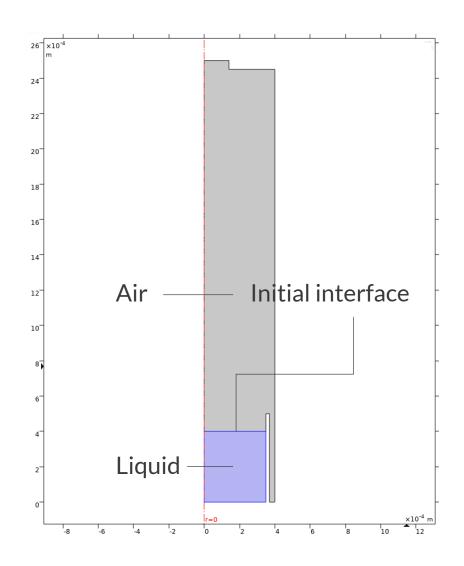
▲ Electrostatics (es) Charge Conservation 1 Axial Symmetry 1 Zero Charge 1 Initial Values 1 Ground 1 Electric Potential 1 Laminar Flow (spf) Fluid Properties 1 Initial Values 1 Axial Symmetry 1 Wall 1 Gravity 1 Volume Force 1 Inlet 1 Outlet 1 ▲ SSE Level Set (Is) Level Set Model 1 Initial Values 1 Axial Symmetry 1 □ No Flow 1 Initial Values 2 Initial Interface 1 ■ Multiphysics

Two-Phase Flow, Level Set 1 (tpf1)

The model tree

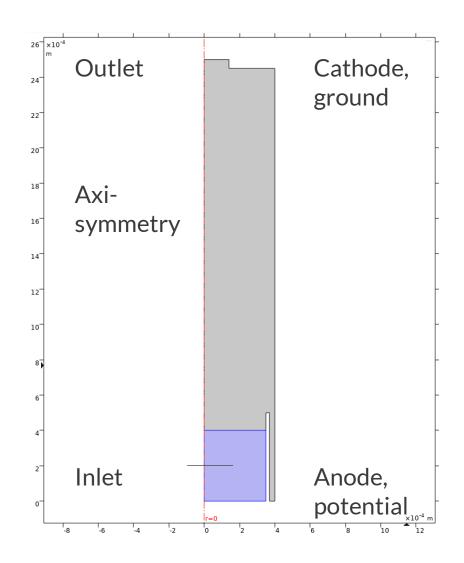
Initial Conditions

- Laminar Flow
 - No velocity
 - Pressure gradient with gravity
- Level Set
 - Initial interface position
- Electrostatics
 - No electric field
- Multiphysics coupling
 - Water and air



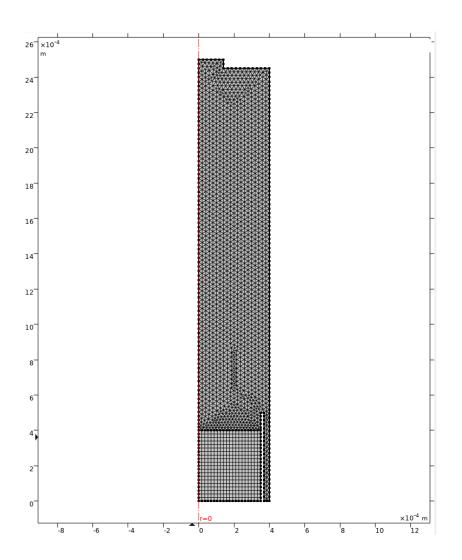
Boundary Conditions

- Laminar Flow
 - Increasing velocity at inlet until constant steady value
 - Constant pressure at outlet
 - Walls
- Level set
 - Inlet and outlet conditions
- Electrostatics
 - Increasing anode potential with time until steady value
- Multiphysics
 - Wetted wall

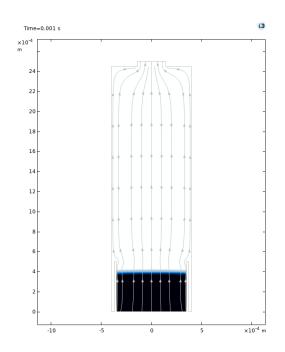


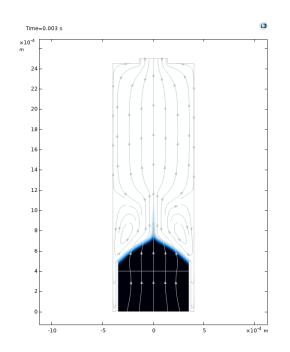
Mesh

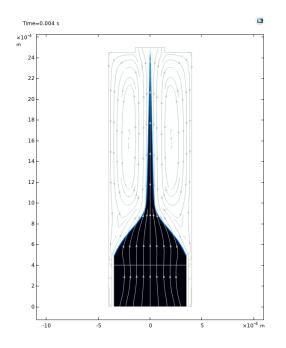
- Mesh fine enough to resolve interface thickness
- Mapped mesh in the initial domain of the liquid
- Triangular mesh in all other domains

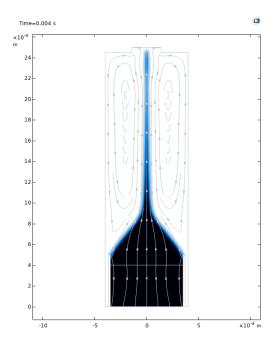


Results: Velocity Field and Surface



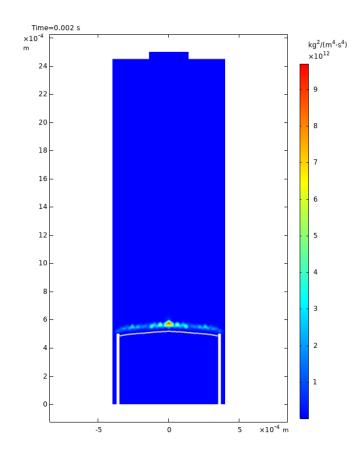


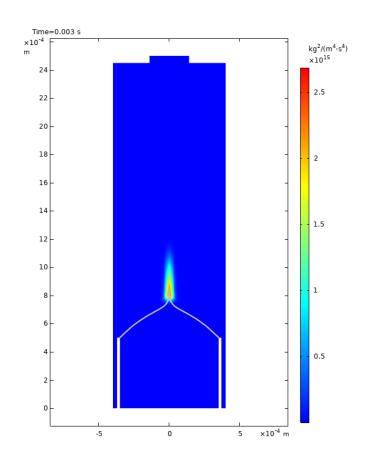


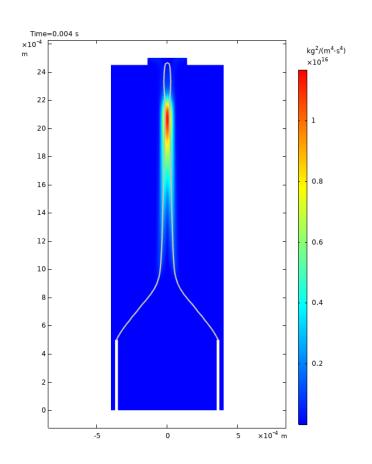




Results: Electrostatic Volume Force



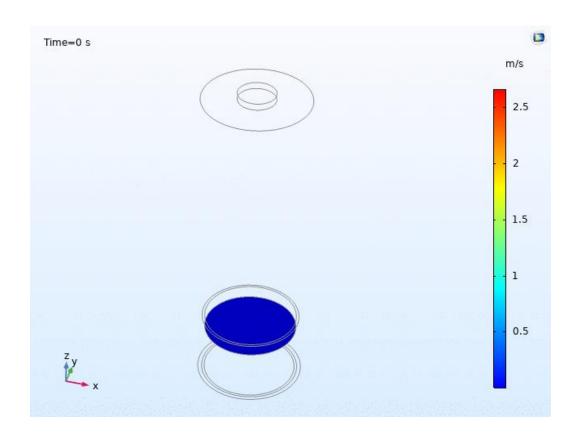






Results: Animation

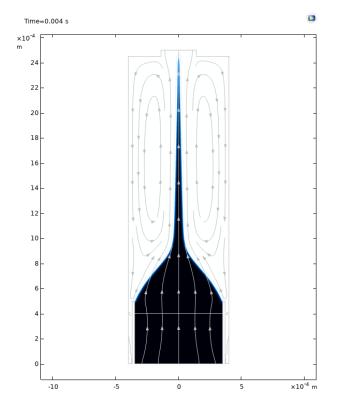
- Surface:
 - Liquid surface
- Color:
 - Flow velocity



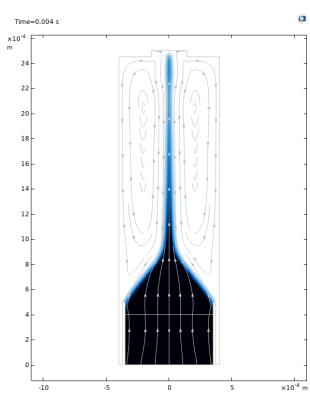
Conclusions

- Interface position:
 - Relatively good agreement between mesh cases
- Small influence of gravity

Extra fine mesh



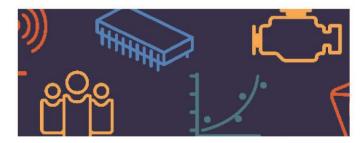
Fine mesh





Further Resources for Inspiration

comsol.com



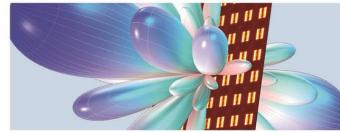
BLOG POSTS



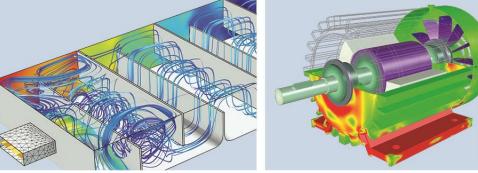
USER STORIES

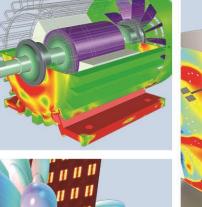


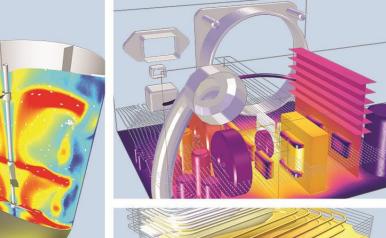
VIDEOS

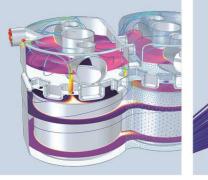


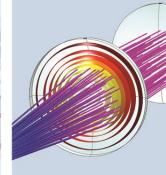
MODELS & APPLICATIONS



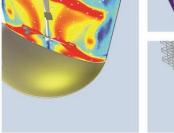


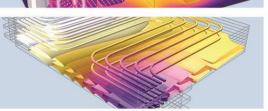


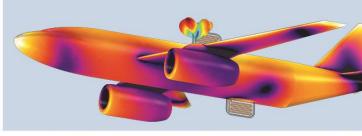


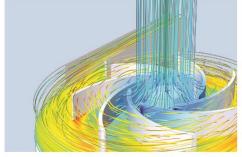


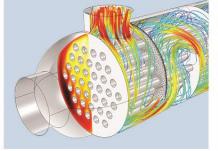


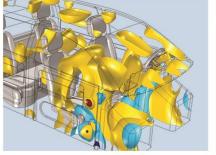


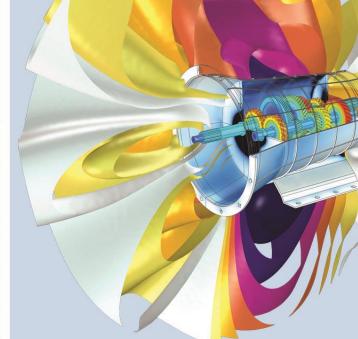












Contact Us

Comsol.com/contact

