

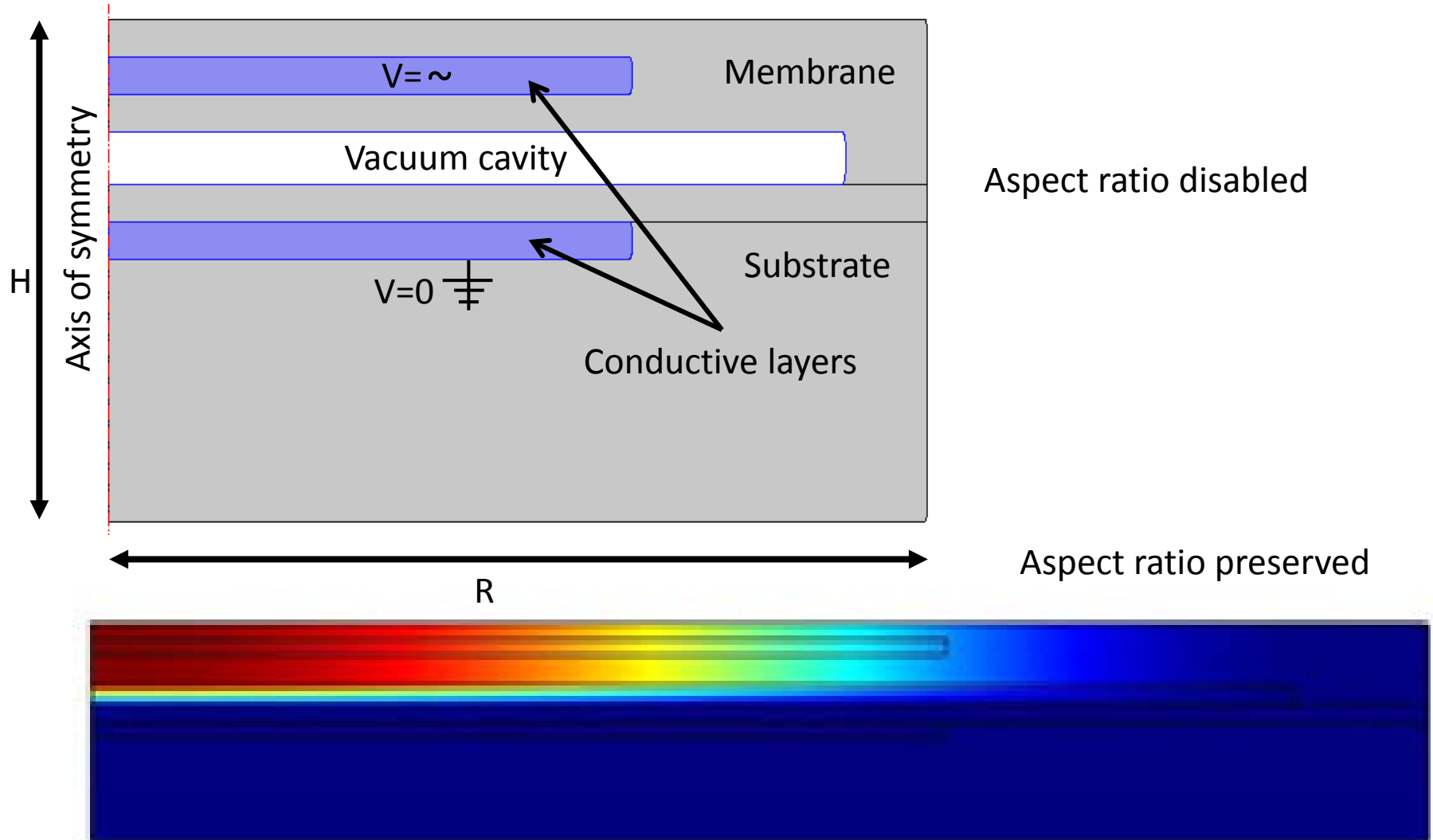
Development of an Ultrasonic Transducer

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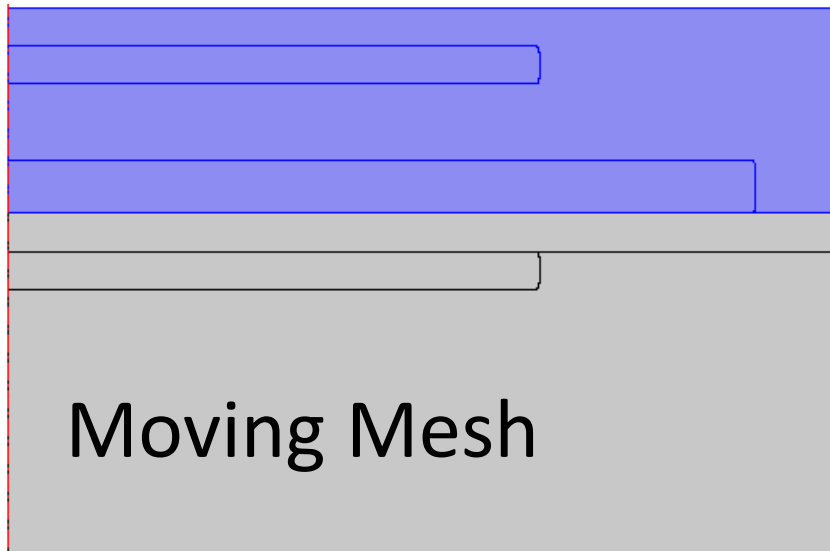
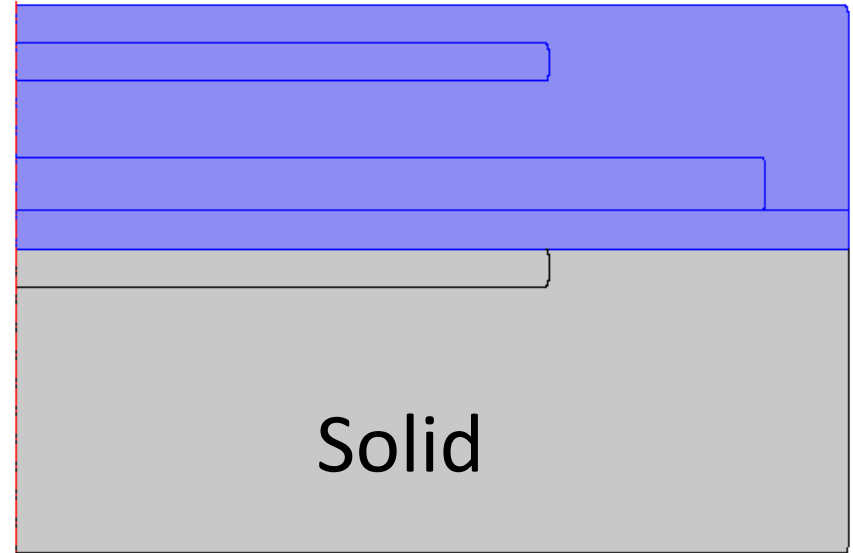
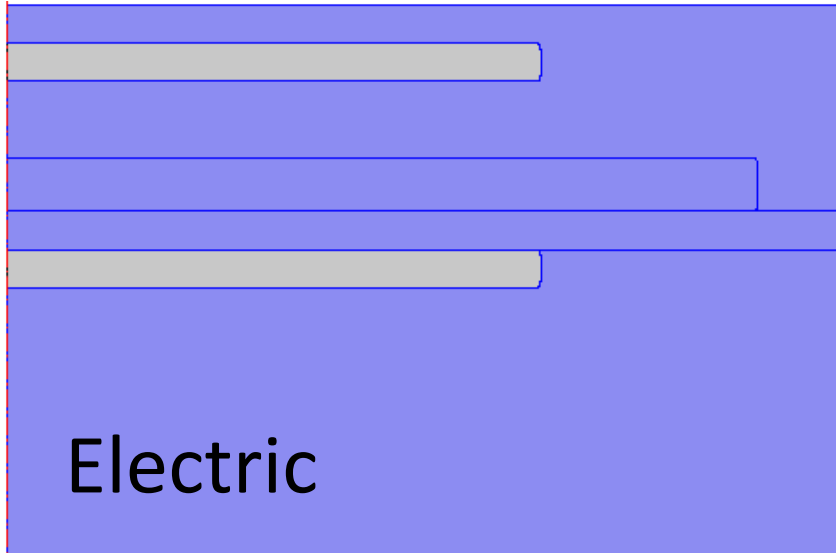
The Capacitive Micromachined Ultrasound Transducer



Characteristics of the system

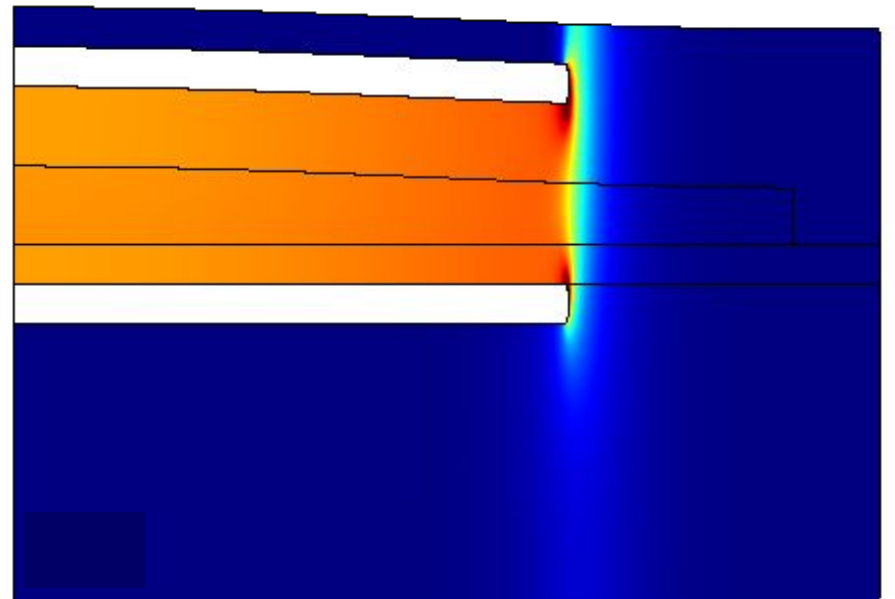
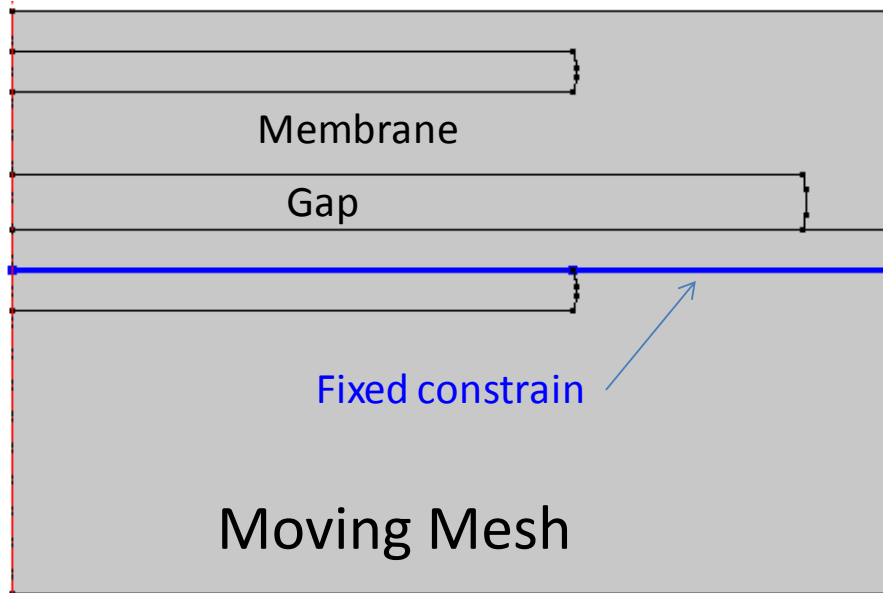
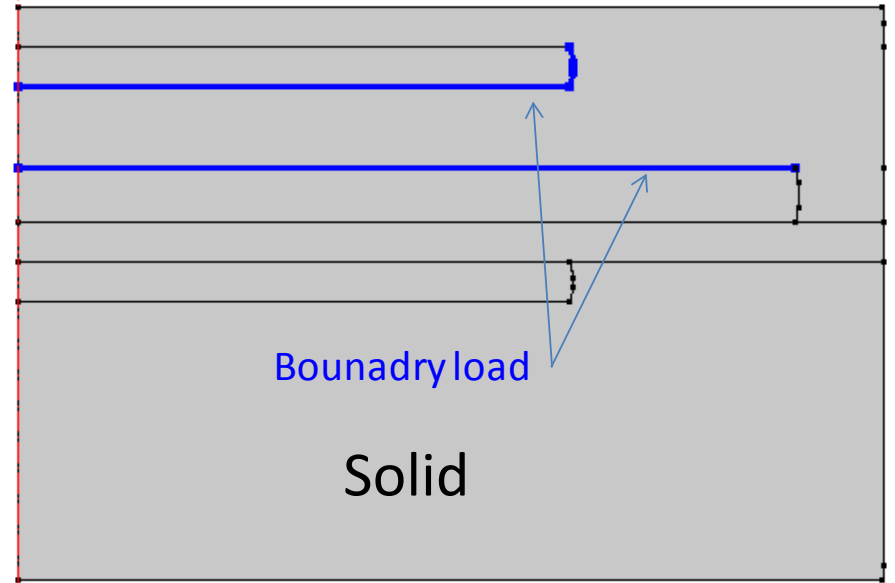
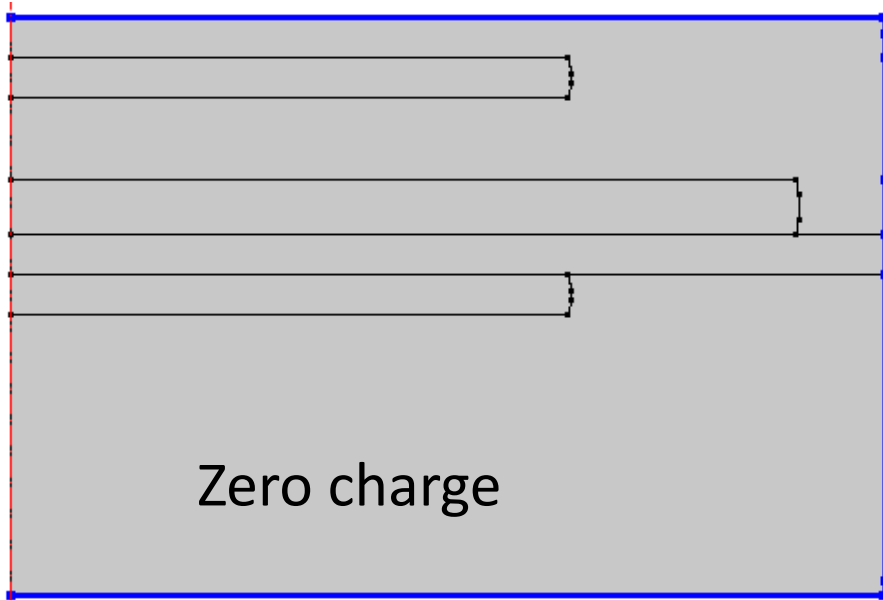
- Electro mechanical coupled phenomena
- Non-linear
- Geometry must deform with the solution
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Simulation approach: Physics/domains

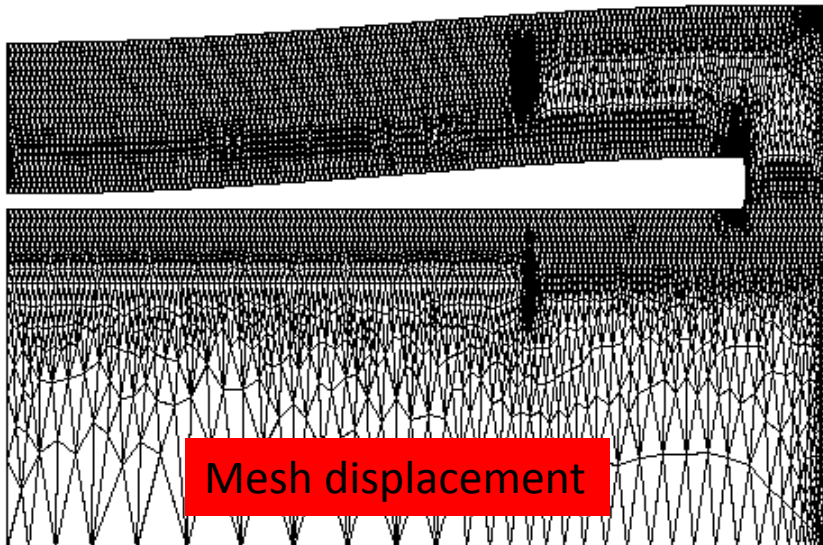
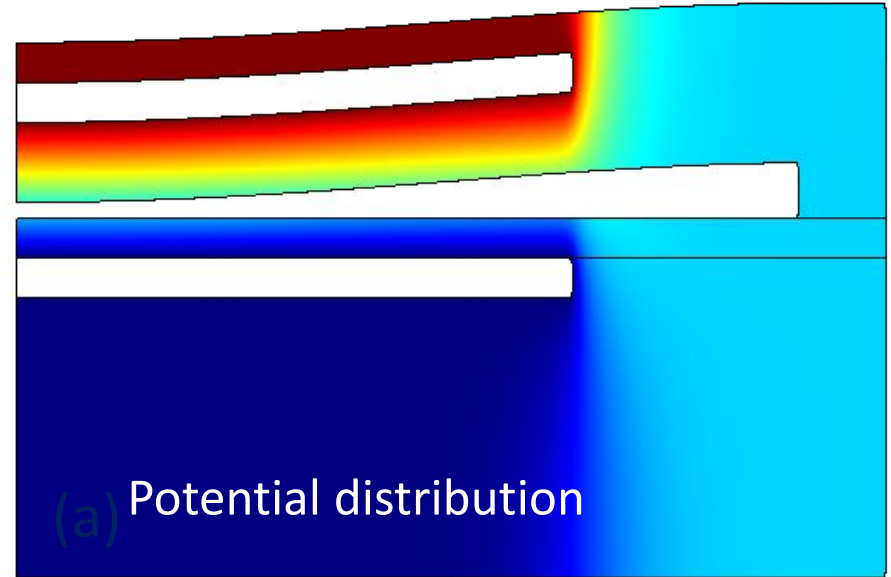
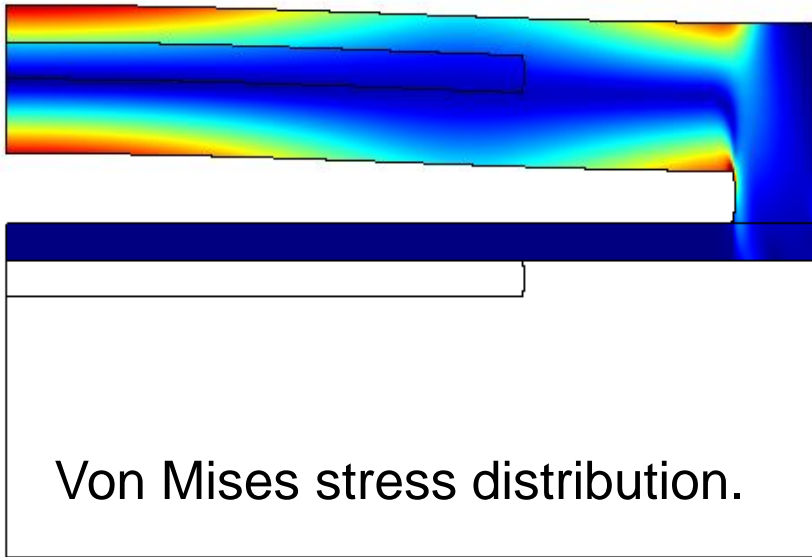


Physics act only on the highlighted domains

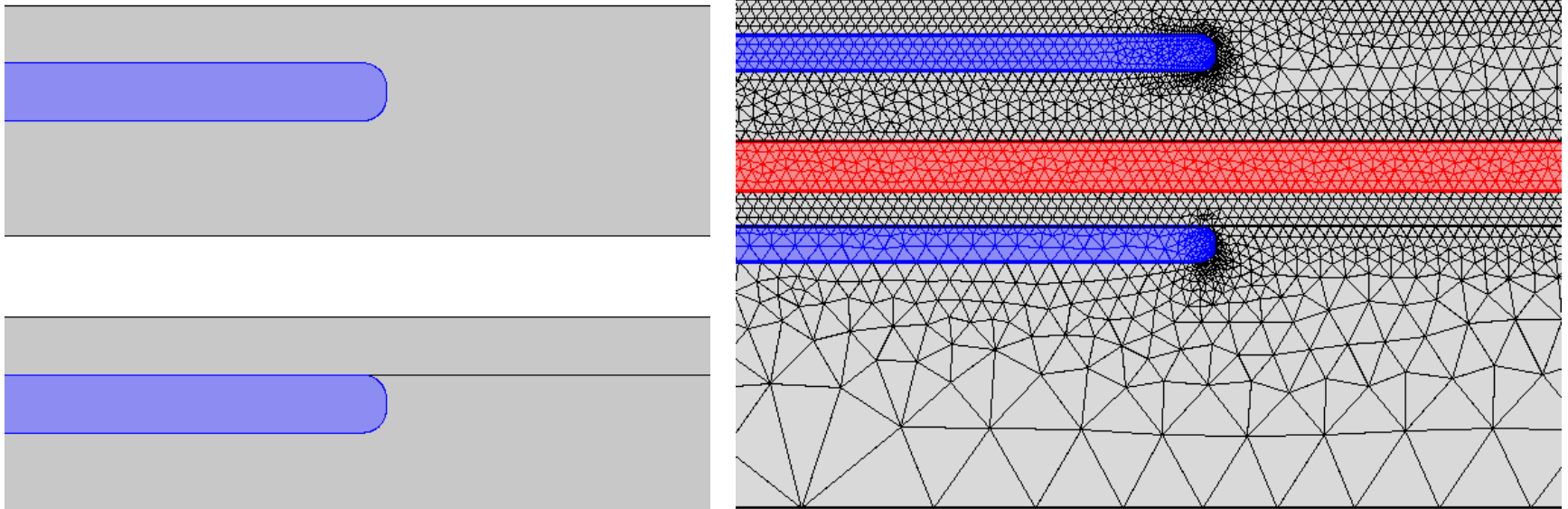
Physics/Boundary conditions



Solutions



Tips



- Rounding edges in solid mechanics and electrostatics. Avoid the “Power of Point effect” and “Crack Propagation effect”
- Refine mesh where the gradient of the solution is higher. Either preemptively, in hindsight or use the automatic remeshing feature of Comsol.
- The vacuum cavity must be modeled as any other domain. Here they were sometimes hidden, but they are there.

Results

