UNIVERSITY OF CALIFORNIA AT BERKELEY   Structural Engineering,
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Lab 11: 04/21/04
Plate Capacitor

1. Consider a plate R with length ℓ, depth d and thickness t located parallel above a grounded plane. The gap between plate and plane is denoted by g. The plate is connected to a voltage generator supplying the voltage V. The corners of the plate have fillets with radius r.

2. Modell the problem in femlab. The permittivity is $\varepsilon_0 = 8.8542 \ 10^{-12} \frac{C^2}{Nm^2}$.

3. Compute the capacitance ratio C/C_{ideal}, where $C_{\text{ideal}} = \varepsilon_0 A/g$ and $C = Q/V$. A is the area of the plate and Q the total charge on the plate given by the surface integral $Q = \int_{\partial R} \varepsilon_0 \mathbf{E} \cdot \mathbf{n} \ dS$.

4. Plot C/C_{ideal} over $r \in (0.1, 1)\mu m$ for $L = 5, 10, 20, 100\mu m$ and $t = g = 2\mu m$.