Electrostatic Simulation

The 2-dimensional application of electrostatics of dielectric materials in COMSOL 3.5a has been used to simulate electric field between parallel electrodes with CNT arrays on one electrode. The domain is a rectangle in 200 x 300 μ m dimension. The CNT models are subtracted from the surrounding dielectric domain of air. Two CNTs in 60 nm diameter and 60 μ m height are located at the bottom electrode with 100 μ m distance between. As boundary conditions, the CNTs and the bottom electrode were grounded and the voltage of 15 V was applied to the top electrode. The condition of side walls were set as symmetric boundaries. Triangular mesh elements were applied in a non-uniform distribution, as created by the default settings of COMSOL. The maximum mesh density has been observed near the CNTs, illustrated in Figure 1a. The grid-size independency was confirmed with the results shown in Figure 1b. The point x=100 and y= 30 μ m has been considered as the reference point at which the strength of electric field with different number of mesh elements when more than 40,000 elements are created.



Figure 1a) Scheme of mesh grids b) Strength of electric field (E) at the reference point (x=100 and y= 30 µm) vs. the number of mesh elements