Miniproject 3. FD numerical method – iterative solution.

Write a Matlab script for the finite-difference analysis of a coaxial cable of rectangular cross-section, as seen in the figure (conductors are shown in gray). Use the iterative method described in lecture and in textbook section 2.11. Assume that a_x = 2 cm, a_y = 1 cm, b_x = 4 cm, bl_y = 1 cm, bh_y = 1.5 cm, V_a = 1 V, and V_b = -1 V. Use tolerance of the potential residual $\delta_V = 1*10^{-4}$ V, and grid spacing d = 0.1 cm. (a) Determine and plot (as 2D color or 3D surface plot) distribution of the potential in the space between conductors. (b) Determine and plot (as a 2D quiver plot) electric field intensity in the space between conductors. (c) Determine and plot (as 1D curves) surface charge density on one horizontal surface of the inner conductor, and one horizontal surface of the outer conductor.