MATLAB EXERCISE 1.30 **Visualizing the electric dipole field.** For the electric dipole from the previous MATLAB exercise, write a program in MATLAB that displays its electric field intensity [magnitude of $\mathbf{E}$ in Eq.(1.43) (from the book)] in the plane $y = 0$ using MATLAB function `pcolor`. *(ME1_30.m on IR)*

SOLUTION:

Figure S1.17 shows the resulting electric field distribution for the dipole.

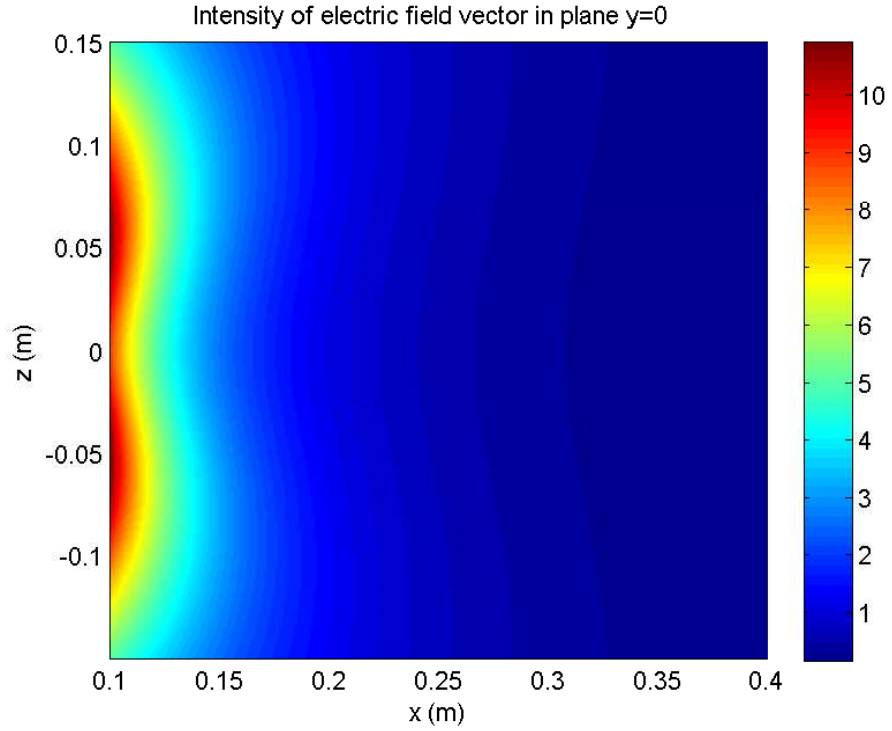

Figure S1.17 Electric field distribution obtained by MATLAB function `pcolor` in the plane $y = 0$ for an electric dipole at the coordinate origin with $\mathbf{p} = 1$ pCm $\hat{\mathbf{z}}$; for MATLAB Exercise 1.30.

```
%
%   Book: MATLAB-Based Electromagnetics (Pearson Prentice Hall)
%   Author: Branislav M. Notaros
%   Instructor Resources
%   (c) 2011
%
%   This MATLAB code or any part of it may be used only for
%   educational purposes associated with the book
%
%
%


%    Visualizing the electric dipole field


clear all;
close all;
eo = 8.854e-12; % Permittivity of air (F/m)
p = 10^(-12); % Moment of electric dipole (C m)
[x,z]=meshgrid(0.1:0.001:0.4, -0.15:0.001:0.15);
% Radial distance
r = sqrt(x.^2 + z.^2);
% Electric field
E = p./(4*pi*eo*r.^3).*sqrt(((2*z./r).^2 + (x./r)).^2);
figure(1);
pcolor(x,z,E);
xlabel('x (m)');
ylabel('z (m)');
title('Intensity of electric field vector in plane y=0');
shading interp;
colorbar;
```