1.1)

% Constant 1/(4\*pi\*epsilon\_0) = 9\*10^9

k = 9\*10^9;

% Enter the Relative permittivity

eps\_r = 1;

charge\_order = 10^-9; % milli, micro, nano etc..

const = k\*charge\_order/eps\_r;

% Enter the dimensions

Nx = 100; % For 1 meter

Ny = 100; % For 1 meter

% Enter the number of charges.

n = 2;

% Electric fields Initialization

E\_f = zeros(Nx,Ny);

Ex = E\_f;

Ey = E\_f;

% Vectors initialization

ex = E\_f;

ey = E\_f;

r = E\_f;

r\_square = E\_f;

% Array of charges

Q = [1,-1];

% Array of locations

X = [0,10];

Y = [0,10];

%-------------------------------------------------------------------------%

% COMPUTATION OF ELECTRIC FIELDS

%-------------------------------------------------------------------------%

% Repeat for all the 'n' charges

for k = 1:n

q = Q(k);

% Compute the unit vectors

for i=1:Nx

for j=1:Ny

r\_square(i,j) = (i-51-X(k))^2+(j-51-Y(k))^2;

r(i,j) = sqrt(r\_square(i,j));

ex(i,j) = ex(i,j)+(i-51-X(k))./r(i,j);

ey(i,j) = ey(i,j)+(j-51-Y(k))./r(i,j);

end

end

E\_f = E\_f + q.\*const./r\_square;

Ex = Ex + E\_f.\*ex.\*const;

Ey = Ex + E\_f.\*ey.\*const;

end

%-------------------------------------------------------------------------%

% PLOT THE RESULTS

%-------------------------------------------------------------------------%

x\_range = (1:Nx)-51;

y\_range = (1:Ny)-51;

%%contour\_range = -8:0.02:8;

%%contour(x\_range,y\_range,E\_f',contour\_range,'linewidth',0.7);

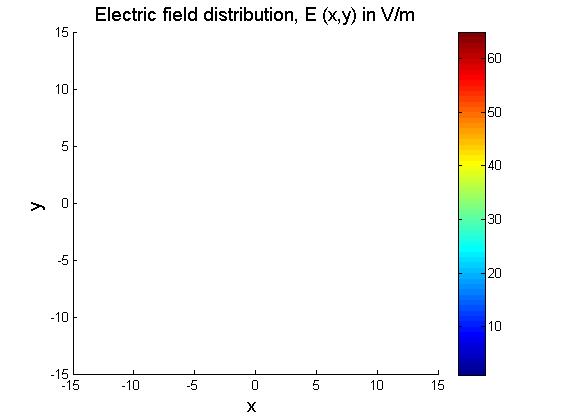
axis([-15 15 -15 15]);

colorbar('location','eastoutside','fontsize',12);

xlabel('x ','fontsize',14);

ylabel('y ','fontsize',14);

title('Electric field distribution, E (x,y) in V/m','fontsize',14);



1.2)

% Constant 1/(4\*pi\*epsilon\_0) = 9\*10^9

k = 9\*10^9;

% Enter the Relative permittivity

eps\_r = 1;

charge\_order = 10^-9; % milli, micro, nano etc..

const = k\*charge\_order/eps\_r;

% Enter the dimensions

Nx = 100; % For 1 meter

Ny = 100; % For 1 meter

% Enter the number of charges.

n = 2;

% Electric fields Initialization

E\_f = zeros(Nx,Ny);

Ex = E\_f;

Ey = E\_f;

% Vectors initialization

ex = E\_f;

ey = E\_f;

r = E\_f;

r\_square = E\_f;

% Array of charges

Q = [1,-1];

% Array of locations

X = [0,10];

Y = [0,10];

%-------------------------------------------------------------------------%

% COMPUTATION OF ELECTRIC FIELDS

%-------------------------------------------------------------------------%

% Repeat for all the 'n' charges

for k = 1:n

q = Q(k);

% Compute the unit vectors

for i=1:Nx

for j=1:Ny

r\_square(i,j) = (i-51-X(k))^2+(j-51-Y(k))^2;

r(i,j) = sqrt(r\_square(i,j));

ex(i,j) = ex(i,j)+(i-51-X(k))./r(i,j);

ey(i,j) = ey(i,j)+(j-51-Y(k))./r(i,j);

end

end

E\_f = E\_f + q.\*const./r\_square;

Ex = Ex + E\_f.\*ex.\*const;

Ey = Ex + E\_f.\*ey.\*const;

end

%-------------------------------------------------------------------------%

% PLOT THE RESULTS

%-------------------------------------------------------------------------%

x\_range = (1:Nx)-51;

y\_range = (1:Ny)-51;

contour\_range = -8:0.02:8;

contour(x\_range,y\_range,E\_f',contour\_range,'linewidth',0.7);

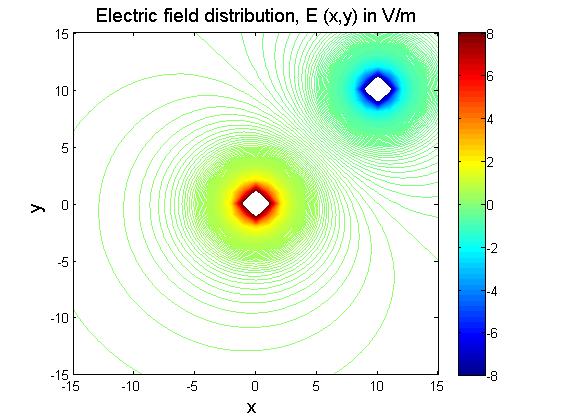
axis([-15 15 -15 15]);

colorbar('location','eastoutside','fontsize',12);

xlabel('x ','fontsize',14);

ylabel('y ','fontsize',14);

title('Electric field distribution, E (x,y) in V/m','fontsize',14);



1.3)

% Constant 1/(4\*pi\*epsilon\_0) = 9\*10^9

k = 9\*10^9;

% Enter the Relative permittivity

eps\_r = 1;

charge\_order = 10^-9; % milli, micro, nano etc..

const = k\*charge\_order/eps\_r;

% Enter the dimensions

Nx = 100; % For 1 meter

Ny = 100;% For 1 meter

Nz=100;

% Enter the number of charges.

n = 2;

% Electric fields Initialization

E\_f = zeros(Nx,Ny);

Ex = E\_f;

Ey = E\_f;

Ez=E\_f;

% Vectors initialization

ex = E\_f;

ey = E\_f;

ez= E\_f;

r = E\_f;

r\_square = E\_f;

% Array of charges

Q = [1,-1,1];

% Array of locations

X = [10,20,30];

Y = [10,20,30];

Z = [10,20,30];

%-------------------------------------------------------------------------%

% COMPUTATION OF ELECTRIC FIELDS

%-------------------------------------------------------------------------%

% Repeat for all the 'n' charges

for k = 1:n

q = Q(k);

% Compute the unit vectors

for i=1:Nx

for j=1:Ny

r\_square(i,j) = (i-51-X(k))^2+(j-51-Y(k))^2;

r(i,j) = sqrt(r\_square(i,j));

ex(i,j) = ex(i,j)+(i-51-X(k))./r(i,j);

ey(i,j) = ey(i,j)+(j-51-Y(k))./r(i,j);

end

end

E\_f = E\_f + q.\*const./r\_square;

Ex = Ex + E\_f.\*ex.\*const;

Ey = Ex + E\_f.\*ey.\*const;

Ez = Ex + E\_f.\*ey.\*const;

end

%-------------------------------------------------------------------------%

% PLOT THE RESULTS

%-------------------------------------------------------------------------%

x\_range = (1:Nx)-51;

y\_range = (1:Ny)-51;

z\_range = (1:Nz)-51;

%%contour\_range = -10:0.02:10;

%%contour(x\_range,y\_range,E\_f',contour\_range,'linewidth',0.7);

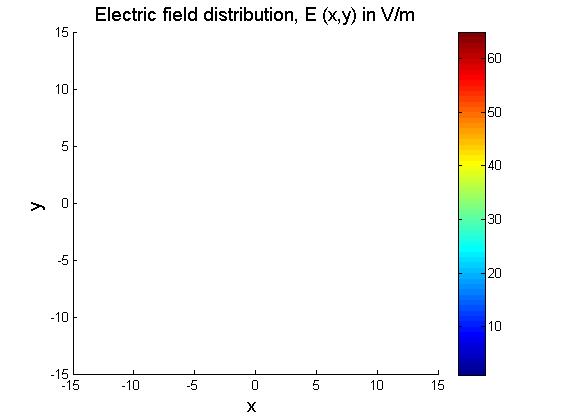
axis([-15 15 -15 15]);

colorbar('location','eastoutside','fontsize',12);

xlabel('x ','fontsize',14);

ylabel('y ','fontsize',14);

title('Electric field distribution, E (x,y) in V/m','fontsize',14);



1.4)

% Constant 1/(4\*pi\*epsilon\_0) = 9\*10^9

k = 9\*10^9;

% Enter the Relative permittivity

eps\_r = 1;

charge\_order = 10^-9; % milli, micro, nano etc..

const = k\*charge\_order/eps\_r;

% Enter the dimensions

Nx = 100; % For 1 meter

Ny = 100;% For 1 meter

Nz=100;

% Enter the number of charges.

n = 2;

% Electric fields Initialization

E\_f = zeros(Nx,Ny);

Ex = E\_f;

Ey = E\_f;

Ez=E\_f;

% Vectors initialization

ex = E\_f;

ey = E\_f;

ez= E\_f;

r = E\_f;

r\_square = E\_f;

% Array of charges

Q = [1,-1,1];

% Array of locations

X = [10,20,30];

Y = [10,20,30];

Z = [10,20,30];

%-------------------------------------------------------------------------%

% COMPUTATION OF ELECTRIC FIELDS

%-------------------------------------------------------------------------%

% Repeat for all the 'n' charges

for k = 1:n

q = Q(k);

% Compute the unit vectors

for i=1:Nx

for j=1:Ny

r\_square(i,j) = (i-51-X(k))^2+(j-51-Y(k))^2;

r(i,j) = sqrt(r\_square(i,j));

ex(i,j) = ex(i,j)+(i-51-X(k))./r(i,j);

ey(i,j) = ey(i,j)+(j-51-Y(k))./r(i,j);

end

end

E\_f = E\_f + q.\*const./r\_square;

Ex = Ex + E\_f.\*ex.\*const;

Ey = Ex + E\_f.\*ey.\*const;

Ez = Ex + E\_f.\*ey.\*const;

end

%-------------------------------------------------------------------------%

% PLOT THE RESULTS

%-------------------------------------------------------------------------%

x\_range = (1:Nx)-51;

y\_range = (1:Ny)-51;

z\_range = (1:Nz)-51;

contour\_range = -10:0.02:10;

contour(x\_range,y\_range,E\_f',contour\_range,'linewidth',0.7);

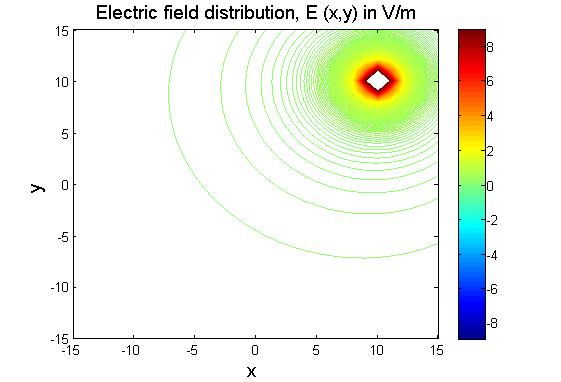
axis([-15 15 -15 15]);

colorbar('location','eastoutside','fontsize',12);

xlabel('x ','fontsize',14);

ylabel('y ','fontsize',14);

title('Electric field distribution, E (x,y) in V/m','fontsize',14);



1.5)

% Constant 1/(4\*pi\*epsilon\_0) = 9\*10^9

k = 9\*10^9;

% Enter the Relative permittivity

eps\_r = 1;

charge\_order = 10^-9; % milli, micro, nano etc..

const = k\*charge\_order/eps\_r;

% Enter the dimensions

Nx = 100; % For 1 meter

Ny = 100;% For 1 meter

Nz=100;

% Enter the number of charges.

n = 2;

% Electric fields Initialization

E\_f = zeros(Nx,Ny);

Ex = E\_f;

Ey = E\_f;

Ez=E\_f;

% Vectors initialization

ex = E\_f;

ey = E\_f;

ez= E\_f;

r = E\_f;

r\_square = E\_f;

% Array of charges

Q = [1,-1,1];

% Array of locations

X = [10,20,30];

Y = [10,20,30];

Z = [10,20,30];

%-------------------------------------------------------------------------%

% COMPUTATION OF ELECTRIC FIELDS

%-------------------------------------------------------------------------%

% Repeat for all the 'n' charges

for k = 1:n

q = Q(k);

% Compute the unit vectors

for i=1:Nx

for j=1:Ny

r\_square(i,j) = (i-51-X(k))^2+(j-51-Y(k))^2;

r(i,j) = sqrt(r\_square(i,j));

ex(i,j) = ex(i,j)+(i-51-X(k))./r(i,j);

ey(i,j) = ey(i,j)+(j-51-Y(k))./r(i,j);

end

end

E\_f = E\_f + q.\*const./r\_square;

Ex = Ex + E\_f.\*ex.\*const;

Ey = Ex + E\_f.\*ey.\*const;

Ez = Ex + E\_f.\*ey.\*const;

end

%-------------------------------------------------------------------------%

% PLOT THE RESULTS

%-------------------------------------------------------------------------%

x\_range = (1:Nx)-51;

y\_range = (1:Ny)-51;

z\_range = (1:Nz)-51;

contour\_range = -10:0.02:10;

contour(x\_range,y\_range,E\_f',contour\_range,'linewidth',0.7);

axis([-15 15 -15 15]);

colorbar('location','eastoutside','fontsize',12);

xlabel('x ','fontsize',14);

ylabel('y ','fontsize',14);

xmax('x ','fontsize',14);

ymax('y ','fontsize',14);

zmax('z','fontsize',14);

title('Electric field distribution, E (x,y) in V/m','fontsize',14);

