FAST National University of Computer and Emerging Sciences, Lahore

Course: EE–117: Applied Physics
Session: Fall 2019

Question:

Charge $Q_1 = 20e$ C is located at point $P_1(2, 3, 4)$ m,
charge $Q_2 = 40e$ C is located at point $P_1(5, -3, 6)$ m,
where $e =$ elementary charge.
Write a MATLAB program to find: (a) Coulomb's force acting on charge Q_1 (F_1), (b) Coulomb's force acting on charge Q_2 (F_2)

Extended Solution:

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%-----------------------%
% Declaring Variables %
%-----------------------%
clear all % clear all variables, etc. from memory
P = 1.602e-19; % electrical charge of proton, C
Ep0 = 8.85e-12; % Air permittivity, F/m
Q1 = 20*P; % 1st charge
Q2 = 40*P; % 2nd charge
P1 = [2 3 4]; % location of 1st charge
P2 = [5 -3 6]; % location of 2nd charge
%-----------------------%
% Computing the forces %
%-----------------------%
R12 = P2-P1; % a vector from point P1 to point P2
R21 = P1-P2; % a vector from point P2 to point P1
R = norm(R12); % norm of vector R12, also norm of vector R21
a12= R12/R; % a unit vector in the direction of vector R12
a21= R21/R; % a unit vector in the direction of vector R12
% Coulomb's law: F = (Q_1 Q_2)/(4 * pi * epislon_0 R^2 ) a_r
F21 = Q1*Q2/(4*pi*Ep0*R^2)*a12; % Force acting on Q2 due to Q1
F12 = Q1*Q2/(4*pi*Ep0*R^2)*a21; % Force acting on Q1 due to Q2
% Display results
F12
F21
```