MATLAB Code

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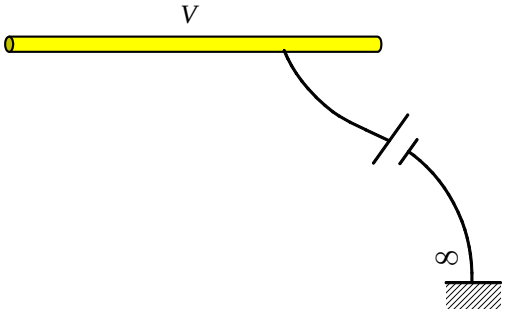
帯電線状導体上の電荷分布



[プログラムリスト]

analyze.m

```
global l a volt nn eps;
l = 1.;
a = 0.001;
volt = 1.;
nn =30;
eps = 8.854e-12;
% Make Z matrix
for i = 1:nn
    for j = 1:nn
        Z(i,j) = zz(i,j);
    end
end;
% Make V vector
for i = 1:nn
    V(i) = volt;
end;
V=V';    % Transpose
I=Z¥V .* 1.e12;    % Solve
% Make position vector for plot
for i = 1:nn
    VPOS(i) = (pos(i-1) + pos(i)) ./ 2.;
end;
VPOS=VPOS';    % Transpose
createfigure(VPOS, I);    % Plot
```

pos.m

```
function val = pos(n)
global l nn;
val = l .* (n ./ nn) - l ./ 2.;
```

r.m

```
function val = r(zo, zs)
global a;
val = sqrt(a .^ 2 + (zo - zs) .^ 2);
```

zz.m

```
function val = zz(m, n)
global eps;
val = quad(@(zs) integrand(m,zs), pos(n-1), pos(n));

function val = integrand(m, zs)
global eps;
val = 1. ./ (4. .* pi .* eps .* r(0.5 .* (pos(m-1)+pos(m)), zs));
```

createfigure.m

(コマンドラインから plot(VPOS, I)を実行後、GUI の M-ファイルの生成で生成)

```
function createfigure(X1, Y1)
%CREATEFIGURE(X1,Y1)
%  X1:  vector of x data
%  Y1:  vector of y data

%  Auto-generated by MATLAB on 15-Nov-2008 17:57:15

% Create figure
figure1 = figure('PaperSize',[20.98 29.68],'Color',[1 1 1]);

% Create axes
axes('Parent',figure1);
% Uncomment the following line to preserve the Y-limits of the axes
% ylim([0 14]);
box('on');
hold('all');
```

```
% Create plot
plot(X1,Y1,'DisplayName','data 1','Marker','o');

% Create xlabel
xlabel({'Position (m)'});

% Create ylabel
ylabel({'Line charge density (pC/m)'});
```

[実行例]

>> analyze

と実行すると、次のグラフが得られる。