Square Spiral Incremental Layer

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X = square_incremental_layer_spiral(N,A,L,d,layers,h,x0,y0,z0,phix,phiy,phiz,view)

This function generates a flat rectangular multilayer spiral - PCB Inductor geometry to be used as a coil.The coil will have enough layers to acomodate all N turns. The coil will be generated with center in (0,0,0) in XY plane. It can be moved using the x0,..,phix... parameters

Parameters

- @param **N** Number of Turns

- @param **A** Width of the coil

- @param **L** Height of the coil

- @param **d** Distane bewtween turns

- @param **h** Total height of the coil (distance_between_coils*n_coils)

- @param **x0** Center position X

- @param **y0** Center position Y

- @param **z0** Center position Z

- @param **phix** Turn respect X axis

- @param **phiy** Turn respect Y axis

- @param **phiz** Turn respect Z axis

- @param **view** Optional parameter, if true generates figure with geometry

- @retval **X** Geometry nodes

Code

```
function X =
square_incremental_layer_spiral(N,A,L,d,h,x0,y0,z0,phix,phiy,phiz,view)
Rx=[1,0,0;0,cos(phix),-sin(phix);0,sin(phix),cos(phix)];
Ry=[cos(phiy),0,sin(phiy);0,1,0;-sin(phiy),0,cos(phiy)];
Rz=[cos(phiz),-sin(phiz),0;sin(phiz),cos(phiz),0;0,0,1];

Nremainding=N;
Nmax=floor(min(A/2,L/2)/d);
```

```matlab
   i=1;
   while Nremainding>0
    if Nremainding>Nmax
     Nlayer(i)=Nmax;
     Nremainding=Nremainding-Nmax;
    else
     Nlayer(i)=Nremainding;
     Nremainding=Nremainding-Nremainding;
    end
    i=i+1;
   end

   hlayer=h/(size(Nlayer,2)-1);

   i=1;
   X=[];
   X=[X,square_spiral(Nlayer(i),A,L,d,0,0,0,0,0,0,false)];
   %@TODO: Clean this fucking mess
   for i=2:1:size(Nlayer,2)
    if  mod(i,2)==1 %Assures the correct direction of the turns
     Xaux=X(:,size(X,2))+[0;0;-hlayer];
     X=[X,Xaux,square_spiral(Nlayer(i),A,L,d,0,0,-
hlayer*(i-1),0,0,0,false)];
     else
     Xaux=fliplr(square_spiral(Nlayer(i),A,L,d,0,0,-
hlayer*(i-1),pi,0,0,false));
     Xaux(:,1)=[];
     Xaux2(:,1)=X(:,size(X,2))+[0;0;-hlayer];
     if Nlayer(i)== Nmax
      X=[X,Xaux2,Xaux,Xaux(:,size(Xaux,2))+[-
d;0;0],Xaux(:,size(Xaux,2))+[-d;L;0] ];
     else
      Xaux(:,1)=[];
      Xaux3=Xaux2+[0;d*(Nmax-Nlayer(i)+1);0];%Solo funciona en
 cuadrados...
      X=[X,Xaux2,Xaux3,Xaux,Xaux(:,size(Xaux,2))+[-
d;0;0],Xaux(:,size(Xaux,2))+[-d;L;0] ];
     end
    end
   end
   for i=1:size(X,2)
    X(:,i)=transpose(Rx*[X(1,i);X(2,i);X(3,i)]);
    X(:,i)=transpose(Ry*[X(1,i);X(2,i);X(3,i)]);
    X(:,i)=transpose(Rz*[X(1,i);X(2,i);X(3,i)]);
    X(:,i)=X(:,i)+[x0;y0;z0];
   end
   if nargin>11
    if view
     plot3(X(1,:),X(2,:),X(3,:))
     grid on
     xlabel('X')
     ylabel('Y')
     zlabel('Z')
     title('Square Layer Spiral');
```
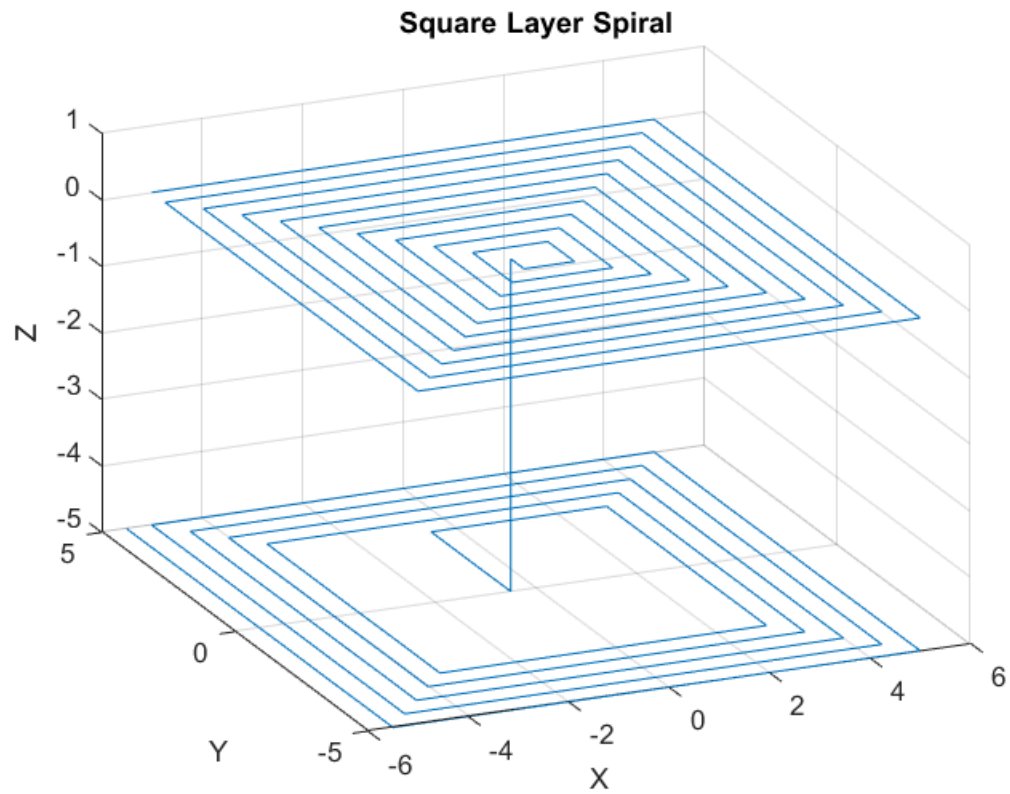
```
        end
    end
end
```

Geometry

Square Layer Spiral

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