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# Square Spiral Incremental Layer

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`X = square_incremental_layer_spiral(N,A,L,d,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 accommodate 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** Distance between turns
- @param **h** Distance between layers of the Coil
- @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];  
  
Nremaining=N;  
Nmax=floor(min(A/2,L/2)/d);
```

```

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

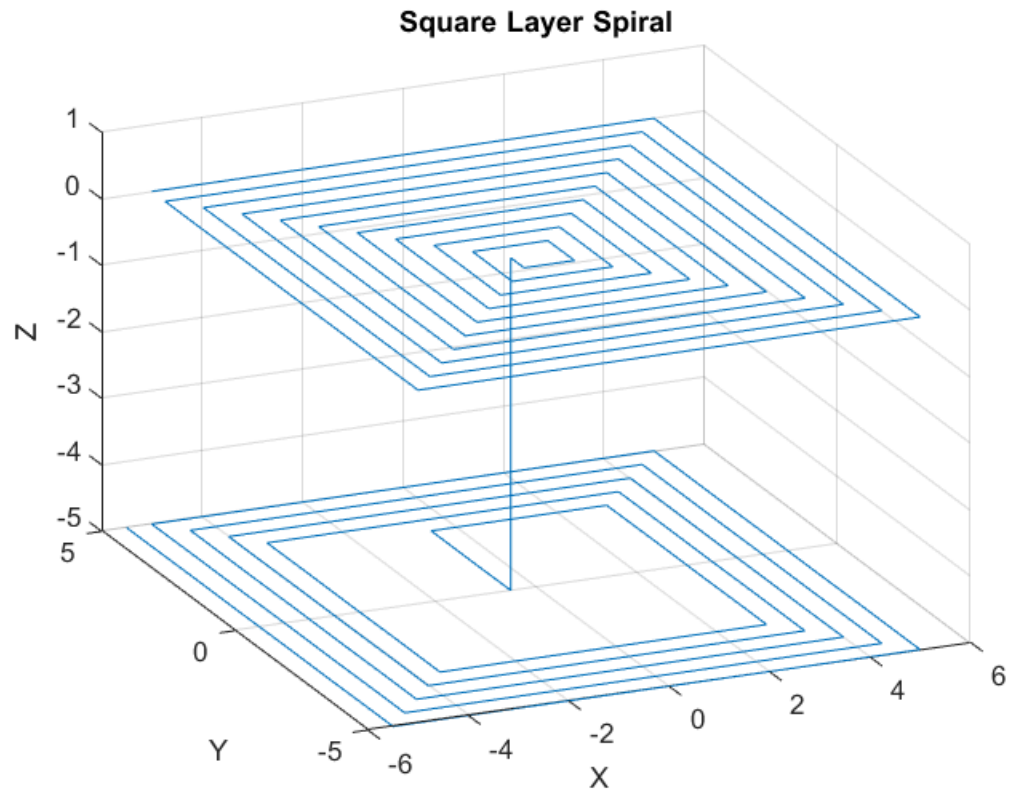
i=1;
X=[];
X=[X,square_spiral(Nlayer(i),A,L,d,0,0,0,0,0,0,false)];
%TODO: Clean this fucking mess
for i=2:1:size(Nlayer,2)
    if mod(i,2)==1 %Assures the correct direction of the turns
        Xaux=X(:,size(X,2))+[0;0;-h];
        X=[X,Xaux,square_spiral(Nlayer(i),A,L,d,0,0,-h*(i-1),0,0,0,false)];
    else
        Xaux=fliplr(square_spiral(Nlayer(i),A,L,d,0,0,-
h*(i-1),pi,0,0,false));
        Xaux(:,1)=[];
        Xaux2(:,1)=X(:,size(X,2))+[0;0;-h];
        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
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

```

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end

## Geometry



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