Generate Coil

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s=generate_coil(coil_name,X,sigma,w,h,nhinc,nwinc,rh,rw)

Author: JCCopyrights Summer 2019 Packages geometry,conductor information and discretization information into a struct Also calculates the length and area of the coil geometry the sctruct is compatible with the function fasthenry_Creator @TODO: Convert coils into a class

Parameters

- @param **coil_name** Coil Identifier
- @param **X** Coil Geometry X(1,:) X points X(2,:) Y points X(3,:) Z points
- @param **sigma** Conductor Conductivity
- @param **w** Coil Width
- @param **h** Coil Height
- @param **nhinc** Conductor Discretization Height
- @param **nwinc** Conductor Discretization Width
- @param **rh** Discretization range
- @param **rw** Discretization range
- @retval **s** Struct Packaged Coil

Code

```
function s=generate_coil(coil_name,X,sigma,w,h,nhinc,nwinc,rh,rw)

 field  = 'X';
 field0 = 'coil_name';
 field1 = 'sigma';        %Conductivity
 field2 = 'w';  field3 = 'h';    %Conductor Width,Height
 field4 = 'nhinc'; field5 = 'nwinc';   %Conductor Discretization
 field6 = 'rh';  field7 = 'rw';   %Discretization range
 %field8 = 'wx';  field9 = 'wy';  field10 = 'wz';
 field11= 'length';
 field12= 'area';
 long=0;
 for i=1:1:length(X)-1
```

```
 long=long+norm(X(:,i+1)-X(:,i));
end
area=w*h;

s =
struct(field0,coil_name,field1,sigma,field2,w,field3,h,field4,nhinc,field5,nwinc,
```

Discretization

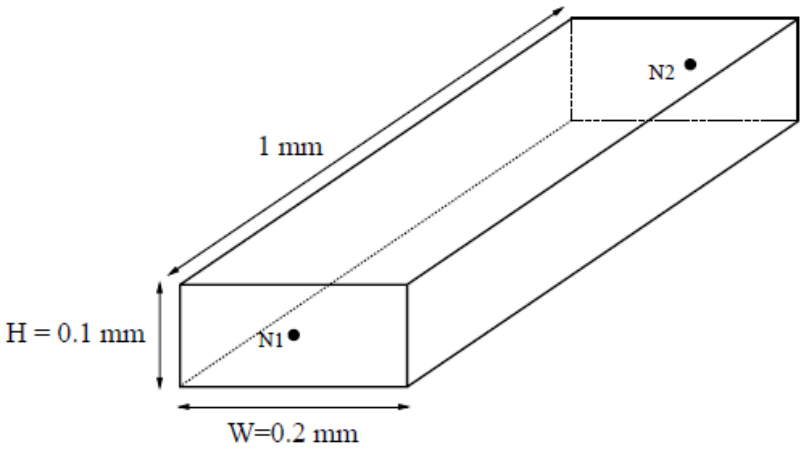

Figure 1: Example Segment for Sample Input File

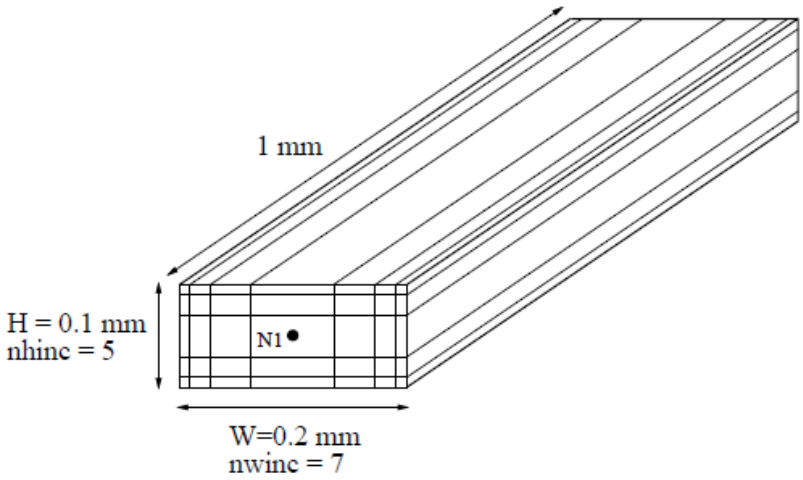

Figure 2: Segment discretized into 35 filaments

AWG Standard sizes

```
%{
```

```
   Conductor       |  Ampacity[A]
-------------------------------------------------------------------
AWG  Diam[mm] Area[mm2] mOhm/m    |  60 Â°C   75 Â°C   90 Â°C
-------------------------------------------------------------------
1  7.348  42.4  0.4066  110  130  145
2  6.544  33.6  0.5127     95  115  130
3  5.827  26.7  0.6465     85  100  115
4  5.189  21.2  0.8152     70  85  95
5  4.621  16.8  1.028     -  -  -
6  4.115  13.3  1.296     55  65  75
7  3.665  10.5  1.634     -  -  -
8  3.264  8.37  2.061     40  50  55
9  2.906  6.63  2.599     -  -  -
10  2.588  5.26  3.277     30  35  40
11  2.305  4.17  4.132     -  -  -
12  2.053  3.31  5.211     20  25  30
13  1.828  2.62  6.571     -  -  -
14  1.628  2.08  8.286     15  20  25
15  1.450  1.65  10.45     -  -  -
16  1.291  1.31  13.17     -  18  -
17  1.150  1.04  16.61     -  -  -
18  1.024  0.823  20.95     10  14  16
19  0.912  0.653  26.42     -  -  -
20  0.812  0.518  33.31     5  11  -
21  0.723  0.410  42.00     -  -  -
22  0.644  0.326  52.96     5  7  -
23  0.573  0.258  66.79     -  -  -
24  0.511  0.205  84.22     2.1  3.5  -
25  0.455  0.162  106.2     -  -  -
26  0.405  0.129  133.9     1.3  2.2  -
27  0.361  0.102  168.9     -  -  -
28  0.321  0.0810  212.9     0.83 1.4  -
29  0.286  0.0642  268.5     -  -  -
30  0.255  0.0509  338.6     0.52 0.86 -
31  0.227  0.0404  426.9     -  -  -
32  0.202  0.0320  538.3     0.32 0.53 -
33  0.180  0.0254  678.8     -  -  -
34  0.160  0.0201  856.0     0.18 0.3  -
35  0.143  0.0160  1079     -  -  -
36  0.127  0.0127  1361     -  -  -
37  0.113  0.0100  1716     -  -  -
38  0.101  0.00797  2164     -  -  -
39  0.0897  0.00632  2729     -  -  -
40  0.0799  0.00501  3441     -  -  -

%}
```

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