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,
```
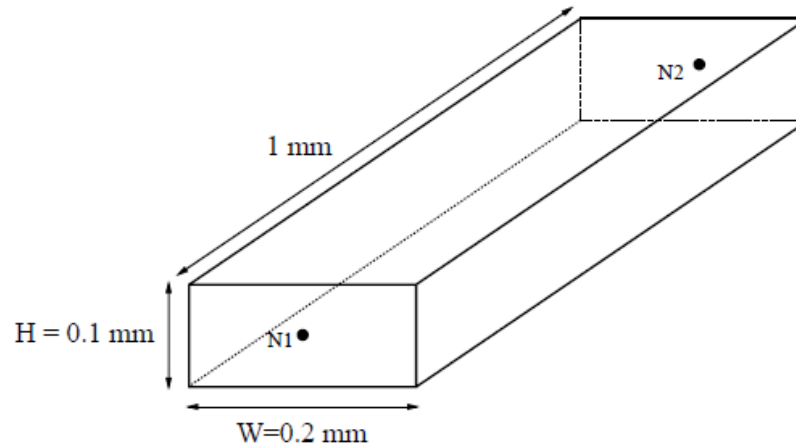
Discretization

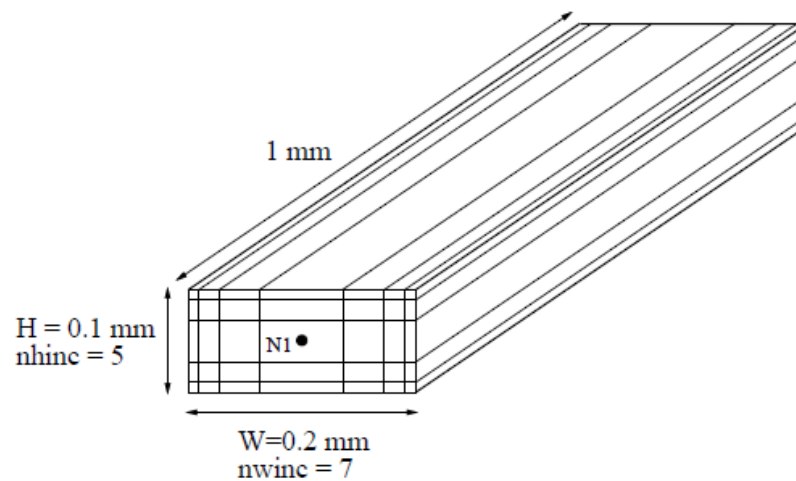Figure 1: Example Segment for Sample Input File

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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