

```

3 Element Phased Array Coil.txt
** A 2 Tesla 3 element MRI phased array coil
** Creator of file: Bing Keong Li, The University of Queensland.
** School of Information Technology and Electrical Engineering

** Variables
#MAXKANR = 1000
#MAXNKA= 1000
#MAXNV= 1000
#scaling = .001

** By changing #X will adjust the overlapping distance
#X = 92

** By changing #Z will adjust the height of the coil
#Z = 2

** Frequency and wavelength
#freq = 85.16e6 ** frequency in Hertz
#lamda = #c0/#freq ** wavelength in metre, #c0 = speed of light in vacuum
#lamda = #lamda/#scaling ** scale the wavelength as desired (e.g. to mm)

** Parameters for segmentation
#seg_rad = .1 ** radius of the wire segments
#seg_len = #lamda/10 ** maximum length of wire segments
#tri_len = #lamda/300 ** maximum edge length for triangular patches
IP #seg_rad #tri_len #seg_len

**Applying the scaling factor
SF 1 #scaling

** Include external geometric files
IN 0 "3LoopStruct.pre"

** End of geometric input
EG 1 0 0 0 0
PS 0 0 1 0

** Set the frequency
FR 21 0 70e6 100E6

** The distributed capacitance value for each coil element
** so that each coil is resonating at 85MHz
LS 101 61e-12
LS 102 61e-12
LS 103 61e-12
LS 104 61e-12
LS 105 61e-12

LS 201 61e-12
LS 202 61e-12
LS 203 61e-12
LS 204 61e-12
LS 205 61e-12

LS 301 61e-12
LS 302 61e-12
LS 303 61e-12
LS 304 61e-12
LS 305 61e-12

** Voltage gap excitation at a segment
** Only one excitation should be made available
** in order to verify that mutual decoupling is achieved.
A1 0 102 1 90

```

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** A1 1 202
 ** A1 1 302

1 90
 1 90

** Calculate surface currents for current display
 ** (For large models this will cause huge output files)
 OS 1 1

** End
 EN

** This the external geometrical data files that make up the structure of
 ** the coil element, which is included in the above master pre file as
 ** "3LoopStruct.pre". Creator of file: Bing Keong Li, The University of
 ** Queensland. School of Information Technology and Electrical Engineering.

#j = 50
 #h = #j+5
 #m = -#j-5
 #f = 60
 #k = 2.5
 #g = 12.5
 #s = -70
 #j1= 40
 #f1= 35
 #g1= 27
 #g2= 22
 #g3= #g2-5
 #g4= -#g2+5

 ** Geometry of radiating structure of Loop 1

DP	L1A1	#g2	#j	0
DP	L1B1	#g2	#f	0
DP	L1A2	#j	#k	0
DP	L1B2	#f	#k	0
DP	L1E1	#f1	#j	0
DP	L1H1	#j1	#f	0
DP	L1A3	-#g2	#j	0
DP	L1B3	-#g2	#f	0
DP	L1A4	-#j	#k	0
DP	L1B4	-#f	#k	0
DP	L1E2	-#f1	#j	0
DP	L1H2	-#j1	#f	0
DP	L1A5	-#j	-#k	0
DP	L1B5	-#f	-#k	0
DP	L1A6	-#k	-#j	0
DP	L1B6	-#k	-#f	0
DP	L1E3	-#f1	-#j	0
DP	L1H3	-#j1	-#f	0
DP	L1A7	#k	-#j	0
DP	L1B7	#k	-#f	0
DP	L1A8	#j	-#k	0
DP	L1B8	#f	-#k	0
DP	L1E4	#f1	-#j	0
DP	L1H4	#j1	-#f	0
DP	L1P1	#g1	#j	0
DP	L1P2	#g1	#f	0
DP	L1P3	#j	#g	0

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DP	L1P4	#f	#g	0
DP	L1P5	-#g1	#j	0
DP	L1P6	-#g1	#f	0
DP	L1P7	-#j	#f1	0
DP	L1P8	-#f	#j1	0
DP	L1P27	-#j	#g	0
DP	L1P28	-#f	#g	0
DP	L1P11	-#g	-#j	0
DP	L1P12	-#g	-#f	0
DP	L1P9	-#j	-#f1	0
DP	L1P10	-#f	-#j1	0
DP	L1P29	-#j	-#g	0
DP	L1P20	-#f	-#g	0
DP	L1P13	#g	-#j	0
DP	L1P14	#g	-#f	0
DP	L1P15	#j	-#f1	0
DP	L1P16	#f	-#j1	0
DP	L1P25	#j	-#g	0
DP	L1P26	#f	-#g	0
DP	L1S1	#g2	#h	0
DP	L1S2	#h	#k	0
DP	L1S3	-#g2	#h	0
DP	L1S4	#m	#k	0
DP	L1S5	#m	-#k	0
DP	L1S6	-#k	#m	0
DP	L1S7	#k	#m	0
DP	L1S8	#h	-#k	0
DP	L1C1	#j	#f1	0
DP	L1C2	#f	#j1	0
DP	L1A21	#g3	#j	0
DP	L1B21	#g3	#f	0
DP	L1S21	#g3	#h	0
DP	L1A23	#g4	#j	0
DP	L1B23	#g4	#f	0
DP	L1S23	#g4	#h	0
DP	L1C20	0	#j	0
DP	L1C21	0	#f	0

 **Connecting all structure points of Loop 1

```

LA      0
BQ      L1P1 L1E1 L1H1 L1P2
BQ      L1E1 L1C1 L1C2 L1H1
BQ      L1P3 L1P4 L1C2 L1C1
BT      L1A1 L1P1 L1S1
BQ      L1P2 L1B1 L1S1 L1P1
BT      L1B2 L1P4 L1S2
BQ      L1P3 L1A2 L1S2 L1P4

BQ      L1P7 L1E2 L1H2 L1P8
BQ      L1E2 L1P5 L1P6 L1H2
BT      L1A4 L1P27L1S4
BQ      L1P28L1B4 L1S4 L1P27
BT      L1B3 L1P6 L1S3
BQ      L1P5 L1A3 L1S3 L1P6
BQ      L1P28L1P27L1P7 L1P8

BQ      L1P11L1E3 L1H3 L1P12
BQ      L1E3 L1P9 L1P10L1H3
BQ      L1P29L1P20L1P10L1P9
BT      L1A6 L1P11L1S6
BQ      L1P12L1B6 L1S6 L1P11
BT      L1B5 L1P20L1S5
  
```

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```

BQ L1P29L1A5 L1S5 L1P20

BQ L1P15L1E4 L1H4 L1P16
BQ L1E4 L1P13L1P14L1H4
BT L1A8 L1P25L1S8
BQ L1P26L1B8 L1S8 L1P25
BT L1B7 L1P14L1S7
BQ L1P13L1A7 L1S7 L1P14
BQ L1P26L1P25L1P15L1P16

BT L1A21L1S21L1C20
BQ L1C21L1C20L1S21L1B21
BT L1A23L1C20L1S23
BQ L1C20L1C21L1B23L1S23

```

** **Assigning Label of Loop 1

```

LA 101
BL L1S1 L1S21
LA 102
BL L1S23L1S3
LA 103
BL L1S4 L1S5
LA 104
BL L1S6 L1S7
LA 105
BL L1S8 L1S2

```

** Geometry of radiating structure of Loop 2

DP	L2A1	#g2+#X	#j	#Z
DP	L2B1	#g2+#X	#f	#Z
DP	L2A2	#j+#X	#k	#Z
DP	L2B2	#f+#X	#k	#Z
DP	L2E1	#f1+#X	#j	#Z
DP	L2H1	#j1+#X	#f	#Z
DP	L2A3	-#g2+#X	#j	#Z
DP	L2B3	-#g2+#X	#f	#Z
DP	L2A4	-#j+#X	#k	#Z
DP	L2B4	-#f+#X	#k	#Z
DP	L2E2	-#f1+#X	#j	#Z
DP	L2H2	-#j1+#X	#f	#Z
DP	L2A5	-#j+#X	-#k	#Z
DP	L2B5	-#f+#X	-#k	#Z
DP	L2A6	-#k+#X	-#j	#Z
DP	L2B6	-#k+#X	-#f	#Z
DP	L2E3	-#f1+#X	-#j	#Z
DP	L2H3	-#j1+#X	-#f	#Z
DP	L2A7	#k+#X	-#j	#Z
DP	L2B7	#k+#X	-#f	#Z
DP	L2A8	#j+#X	-#k	#Z
DP	L2B8	#f+#X	-#k	#Z
DP	L2E4	#f1+#X	-#j	#Z
DP	L2H4	#j1+#X	-#f	#Z
DP	L2P1	#g1+#X	#j	#Z
DP	L2P2	#g1+#X	#f	#Z
DP	L2P3	#j+#X	#g	#Z
DP	L2P4	#f+#X	#g	#Z
DP	L2P5	-#g1+#X	#j	#Z
DP	L2P6	-#g1+#X	#f	#Z
DP	L2P7	-#j+#X	#f1	#Z
DP	L2P8	-#f+#X	#j1	#Z
DP	L2P27	-#j+#X	#g	#Z
DP	L2P28	-#f+#X	#g	#Z

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DP	L2P11	-#g+#X	-#j	#Z
DP	L2P12	-#g+#X	-#f	#Z
DP	L2P9	-#j+#X	-#f1	#Z
DP	L2P10	-#f+#X	-#j1	#Z
DP	L2P29	-#j+#X	-#g	#Z
DP	L2P20	-#f+#X	-#g	#Z
DP	L2P13	#g+#X	-#j	#Z
DP	L2P14	#g+#X	-#f	#Z
DP	L2P15	#j+#X	-#f1	#Z
DP	L2P16	#f+#X	-#j1	#Z
DP	L2P25	#j+#X	-#g	#Z
DP	L2P26	#f+#X	-#g	#Z
DP	L2S1	#g2+#X	#h	#Z
DP	L2S2	#h+#X	#k	#Z
DP	L2S3	-#g2+#X	#h	#Z
DP	L2S4	#m+#X	#k	#Z
DP	L2S5	#m+#X	-#k	#Z
DP	L2S6	-#k+#X	#m	#Z
DP	L2S7	#k+#X	#m	#Z
DP	L2S8	#h+#X	-#k	#Z
DP	L2C1	#j+#X	#f1	#Z
DP	L2C2	#f+#X	#j1	#Z
DP	L2A21	#g3+#X	#j	#Z
DP	L2B21	#g3+#X	#f	#Z
DP	L2S21	#g3+#X	#h	#Z
DP	L2A23	#g4+#X	#j	#Z
DP	L2B23	#g4+#X	#f	#Z
DP	L2S23	#g4+#X	#h	#Z
DP	L2C20	0+#X	#j	#Z
DP	L2C21	0+#X	#f	#Z

 **Connecting all structure points of Loop 2

```

LA      0
BQ     L2P1 L2E1 L2H1 L2P2
BQ     L2E1 L2C1 L2C2 L2H1
BQ     L2P3 L2P4 L2C2 L2C1
BT     L2A1 L2P1 L2S1
BQ     L2P2 L2B1 L2S1 L2P1
BT     L2B2 L2P4 L2S2
BQ     L2P3 L2A2 L2S2 L2P4

BQ     L2P7 L2E2 L2H2 L2P8
BQ     L2E2 L2P5 L2P6 L2H2
BT     L2A4 L2P27L2S4
BQ     L2P28L2B4 L2S4 L2P27
BT     L2B3 L2P6 L2S3
BQ     L2P5 L2A3 L2S3 L2P6
BQ     L2P28L2P27L2P7 L2P8

BQ     L2P11L2E3 L2H3 L2P12
BQ     L2E3 L2P9 L2P10L2H3
BQ     L2P29L2P20L2P10L2P9
BT     L2A6 L2P11L2S6
BQ     L2P12L2B6 L2S6 L2P11
BT     L2B5 L2P20L2S5
BQ     L2P29L2A5 L2S5 L2P20

BQ     L2P15L2E4 L2H4 L2P16
BQ     L2E4 L2P13L2P14L2H4
BT     L2A8 L2P25L2S8
BQ     L2P26L2B8 L2S8 L2P25
BT     L2B7 L2P14L2S7
BQ     L2P13L2A7 L2S7 L2P14
  
```

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BQ L2P26L2P25L2P15L2P16
 BT L2A21L2S21L2C20
 BQ L2C21L2C20L2S21L2B21
 BT L2A23L2C20L2S23
 BQ L2C20L2C21L2B23L2S23

** **Assigning Label of Loop 2

LA 201
 BL L2S1 L2S21
 LA 202
 BL L2S23L2S3
 LA 203
 BL L2S4 L2S5
 LA 204
 BL L2S6 L2S7
 LA 205
 BL L2S8 L2S2

** Geometry of radiating structure of Loop 3

DP	L3A1	#g2-#X	#j	#Z
DP	L3B1	#g2-#X	#f	#Z
DP	L3A2	#j-#X	#k	#Z
DP	L3B2	#f-#X	#k	#Z
DP	L3E1	#f1-#X	#j	#Z
DP	L3H1	#j1-#X	#f	#Z
DP	L3A3	-#g2-#X	#j	#Z
DP	L3B3	-#g2-#X	#f	#Z
DP	L3A4	-#j-#X	#k	#Z
DP	L3B4	-#f-#X	#k	#Z
DP	L3E2	-#f1-#X	#j	#Z
DP	L3H2	-#j1-#X	#f	#Z
DP	L3A5	-#j-#X	-#k	#Z
DP	L3B5	-#f-#X	-#k	#Z
DP	L3A6	-#k-#X	-#j	#Z
DP	L3B6	-#k-#X	-#f	#Z
DP	L3E3	-#f1-#X	-#j	#Z
DP	L3H3	-#j1-#X	-#f	#Z
DP	L3A7	#k-#X	-#j	#Z
DP	L3B7	#k-#X	-#f	#Z
DP	L3A8	#j-#X	-#k	#Z
DP	L3B8	#f-#X	-#k	#Z
DP	L3E4	#f1-#X	-#j	#Z
DP	L3H4	#j1-#X	-#f	#Z
DP	L3P1	#g1-#X	#j	#Z
DP	L3P2	#g1-#X	#f	#Z
DP	L3P3	#j-#X	#g	#Z
DP	L3P4	#f-#X	#g	#Z
DP	L3P5	-#g1-#X	#j	#Z
DP	L3P6	-#g1-#X	#f	#Z
DP	L3P7	-#j-#X	#f1	#Z
DP	L3P8	-#f-#X	#j1	#Z
DP	L3P27	-#j-#X	#g	#Z
DP	L3P28	-#f-#X	#g	#Z
DP	L3P11	-#g-#X	-#j	#Z
DP	L3P12	-#g-#X	-#f	#Z
DP	L3P9	-#j-#X	-#f1	#Z
DP	L3P10	-#f-#X	-#j1	#Z
DP	L3P29	-#j-#X	-#g	#Z
DP	L3P20	-#f-#X	-#g	#Z
DP	L3P13	#g-#X	-#j	#Z

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DP	L3P14	#g-#X	-#f	#Z
DP	L3P15	#j-#X	-#f1	#Z
DP	L3P16	#f-#X	-#j1	#Z
DP	L3P25	#j-#X	-#g	#Z
DP	L3P26	#f-#X	-#g	#Z
DP	L3S1	#g2-#X	#h	#Z
DP	L3S2	#h-#X	#k	#Z
DP	L3S3	-#g2-#X	#h	#Z
DP	L3S4	#m-#X	#k	#Z
DP	L3S5	#m-#X	-#k	#Z
DP	L3S6	-#k-#X	#m	#Z
DP	L3S7	#k-#X	#m	#Z
DP	L3S8	#h-#X	-#k	#Z
DP	L3C1	#j-#X	#f1	#Z
DP	L3C2	#f-#X	#j1	#Z
DP	L3A21	#g3-#X	#j	#Z
DP	L3B21	#g3-#X	#f	#Z
DP	L3S21	#g3-#X	#h	#Z
DP	L3A23	#g4-#X	#j	#Z
DP	L3B23	#g4-#X	#f	#Z
DP	L3S23	#g4-#X	#h	#Z
DP	L3C20	0-#X	#j	#Z
DP	L3C21	0-#X	#f	#Z

 **Connecting all structure points of Loop 3

```

LA      0
BQ      L3P1 L3E1 L3H1 L3P2
BQ      L3E1 L3C1 L3C2 L3H1
BQ      L3P3 L3P4 L3C2 L3C1
BT      L3A1 L3P1 L3S1
BQ      L3P2 L3B1 L3S1 L3P1
BT      L3B2 L3P4 L3S2
BQ      L3P3 L3A2 L3S2 L3P4

BQ      L3P7 L3E2 L3H2 L3P8
BQ      L3E2 L3P5 L3P6 L3H2
BT      L3A4 L3P27L3S4
BQ      L3P28L3B4 L3S4 L3P27
BT      L3B3 L3P6 L3S3
BQ      L3P5 L3A3 L3S3 L3P6
BQ      L3P28L3P27L3P7 L3P8

BQ      L3P11L3E3 L3H3 L3P12
BQ      L3E3 L3P9 L3P10L3H3
BQ      L3P29L3P20L3P10L3P9
BT      L3A6 L3P11L3S6
BQ      L3P12L3B6 L3S6 L3P11
BT      L3B5 L3P20L3S5
BQ      L3P29L3A5 L3S5 L3P20

BQ      L3P15L3E4 L3H4 L3P16
BQ      L3E4 L3P13L3P14L3H4
BT      L3A8 L3P25L3S8
BQ      L3P26L3B8 L3S8 L3P25
BT      L3B7 L3P14L3S7
BQ      L3P13L3A7 L3S7 L3P14
BQ      L3P26L3P25L3P15L3P16

BT      L3A21L3S21L3C20
BQ      L3C21L3C20L3S21L3B21
BT      L3A23L3C20L3S23
BQ      L3C20L3C21L3B23L3S23
  
```

** **Assigning Label of Loop 3

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LA 301
BL L3S1 L3S21
LA 302
BL L3S23L3S3
LA 303
BL L3S4 L3S5
LA 304
BL L3S6 L3S7
LA 305
BL L3S8 L3S2