Eliminating Excess Surface Fields in the Input Coupler

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2/24/00

① Matched Input Couplers typically show a Peak in $|E|(0,0,3)$ in the Coupler.

② Input Couplers appear to be susceptible to arcing and to exhibit surface erosion.

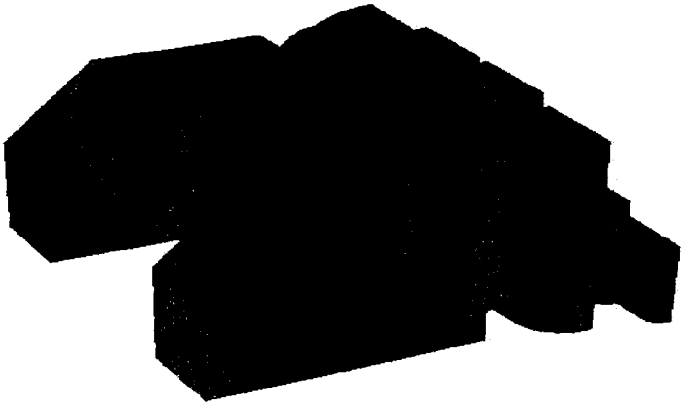
$|E(0,0,3)|$ is not a surface field.

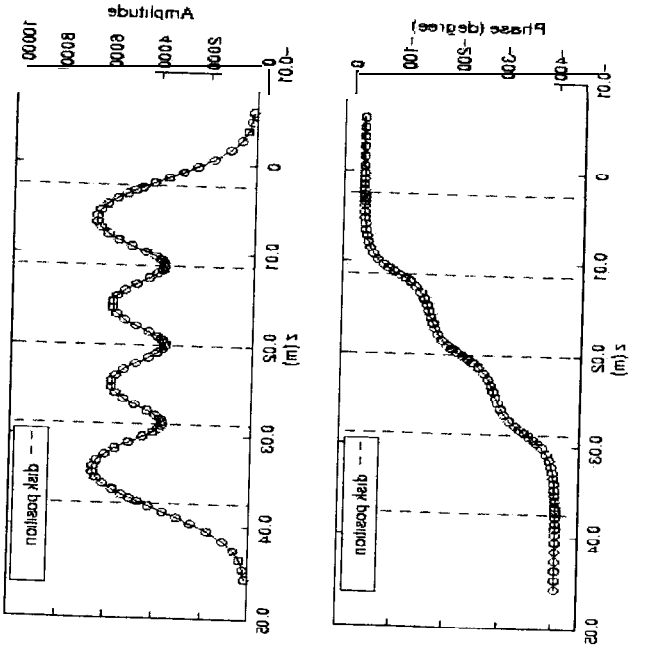
We need to look at $E(0, \sim a_c, 3)$ and

$|E(\sim a_c, 0, 3)|$

a_c is radius of beam iris at first cell

Surface field peaks at $x \sim a_c$, $y \sim a_c$.




Phase (degree)
0
-100
-200
-300
-400
-0.01
0
0.01
0.02
0.03
0.04
0.05
t (m)
noisy pos'n
Amplitude
10000
8000
6000
4000
2000
0
-0.01
0
0.01
0.02
0.03
0.04
0.05
t (m)
true pos'n

MAFIA

FRAME: 1 24/11/99 - 14:34:23 VERSION[V4.010]

FREQUENCY/Hi! 1.1424000000000E+10

Norman's formula

PBG_6C_SF_11424MHZ_48NS_RC10155_W406_D4258_BH45_2X1XMESH.DRC

7X7 [1/4] METAL PHOTONIC BAND GAP 6 CELL CAVITY
DESIGN RESONANCE FREQUENCY: 11.429 GHZ

SQRT [EALL2MAG[I]]*[7.523E-05, 7.523E-05, 7.523E-05]

P--:4010

#1DGRAPH

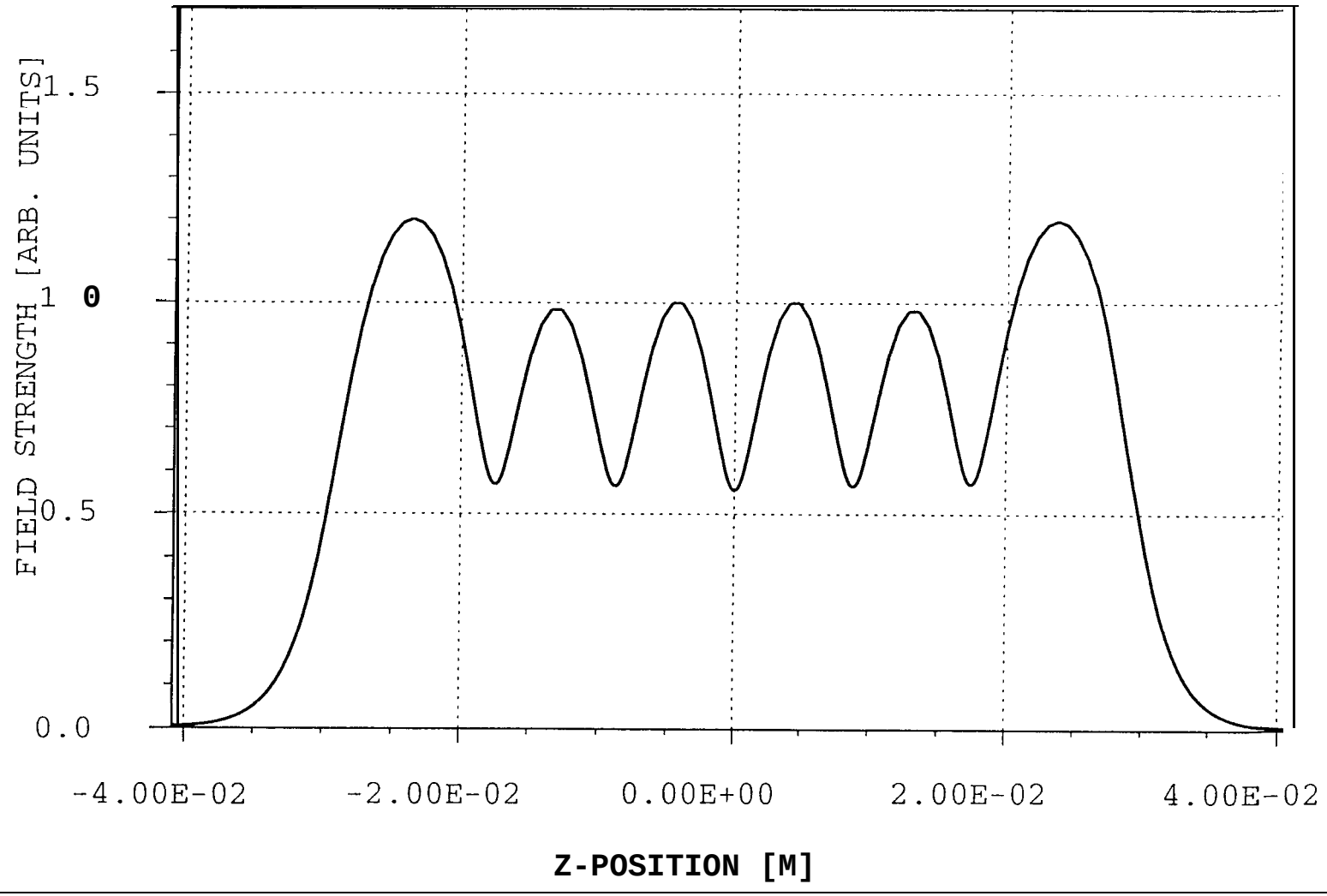
RDINATE: EALLMAG
OMFONENT: -

IXED COORDINATES:
IM.....MESHLINE
X 1
Y 1
T 146212

BSCISSA: GECMTIME
BASE OF EALLMAG]

EFERENCE COORDINATE: Z
ARY.....MESHLINE
ROM 1
TO 177

TOTAL E-FIELD MAGNITUDE VS Z



MAFIA

FRAME: 13 24/11/99 - 14:34:23 VERSION[V4.010]

FREQUENCY/HZ 1.1424000000000E+10

PEG_6C_SF_11424MHZ_48NS_RC10155_W406_D4288_BH45_2X1XMESH.DRC

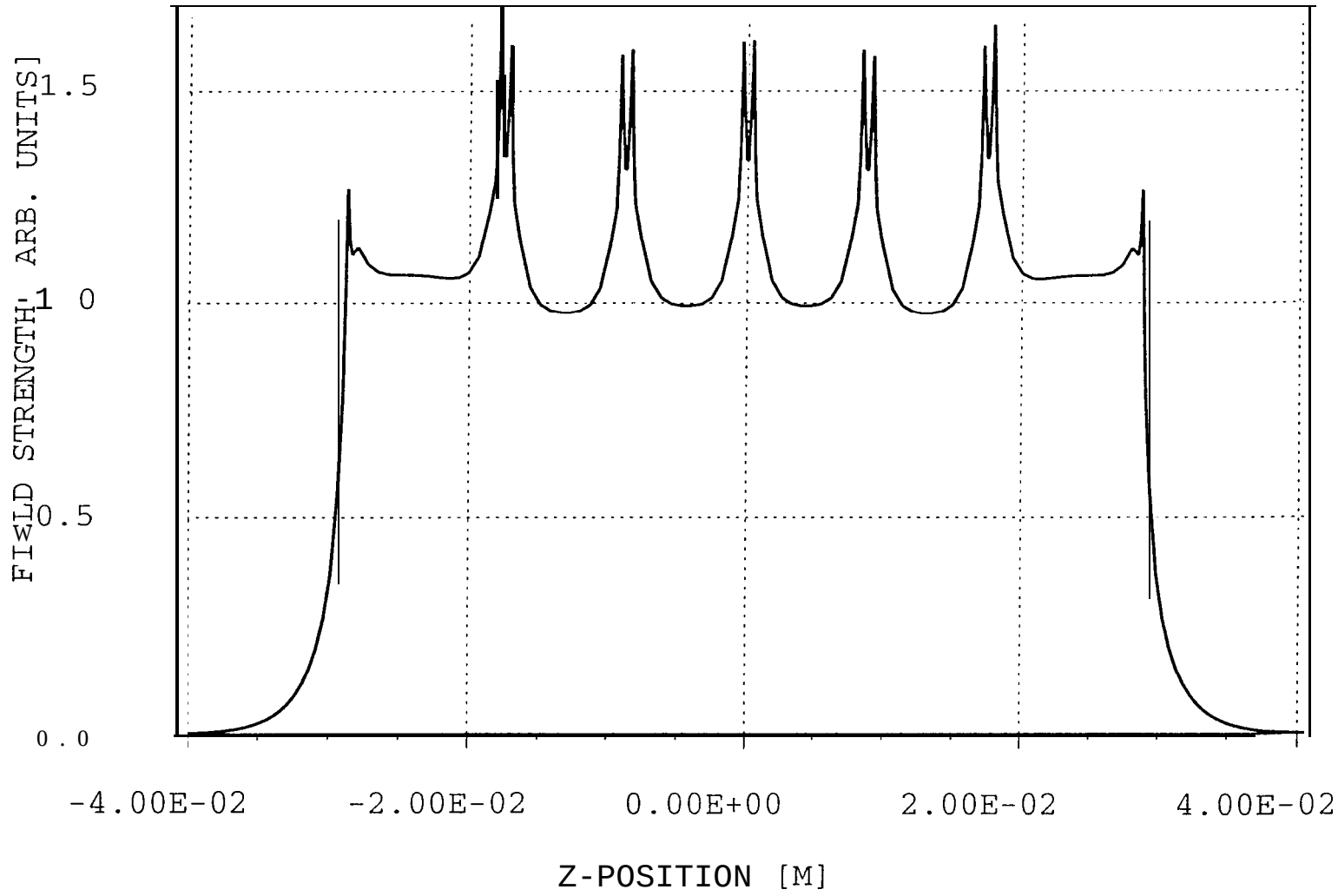
7X7 [1/4] METAL I'HOTONIC BAND GAP 6-CELL CAVITY
DESIGN RESONANCE FREQUENCY: 11.424 GHZ

SQRT [EALL2MAG[I]]*{ 7.523E-05, 7.523E-05, 7.523E-05}

P--:4010

#1DGRAPH

TOTAL E-FIELD MAGNITUDE VS Z



)RDINATE: EALLMAG
:OMPONENT: ~

'IXED COORDINATES:
)IM.....MESHLINE
X 1
Y 22
T 146212

ABSCISSA: GEOMTIME
BASE OF EALLMAG]

:EFERENCE COORDINATE: Z
'ARY.....MESHLINE
'ROM 1
TO 177

MAFIA

FRAME: 33 24/11/99 - 14:34:23 VERSION[V4.010] PBG_6C_SF_11424MHZ_48NS_RC10155_W406_D4288_BH45_2X1XMESH.DRC

FREQUENCY/HZ 1.1424000000000E+10

7X7 [1/4] METAL PHOTONIC BAND GAP 6-CELL CAVITY
DESIGN RESONANCE FREQUENCY: 11.424 GHZ

SQRT [EALL2MAG[I]]*[7.523E-05, 7.523E-05, 7.523E-05]

P--:4010

#1DGRAPH

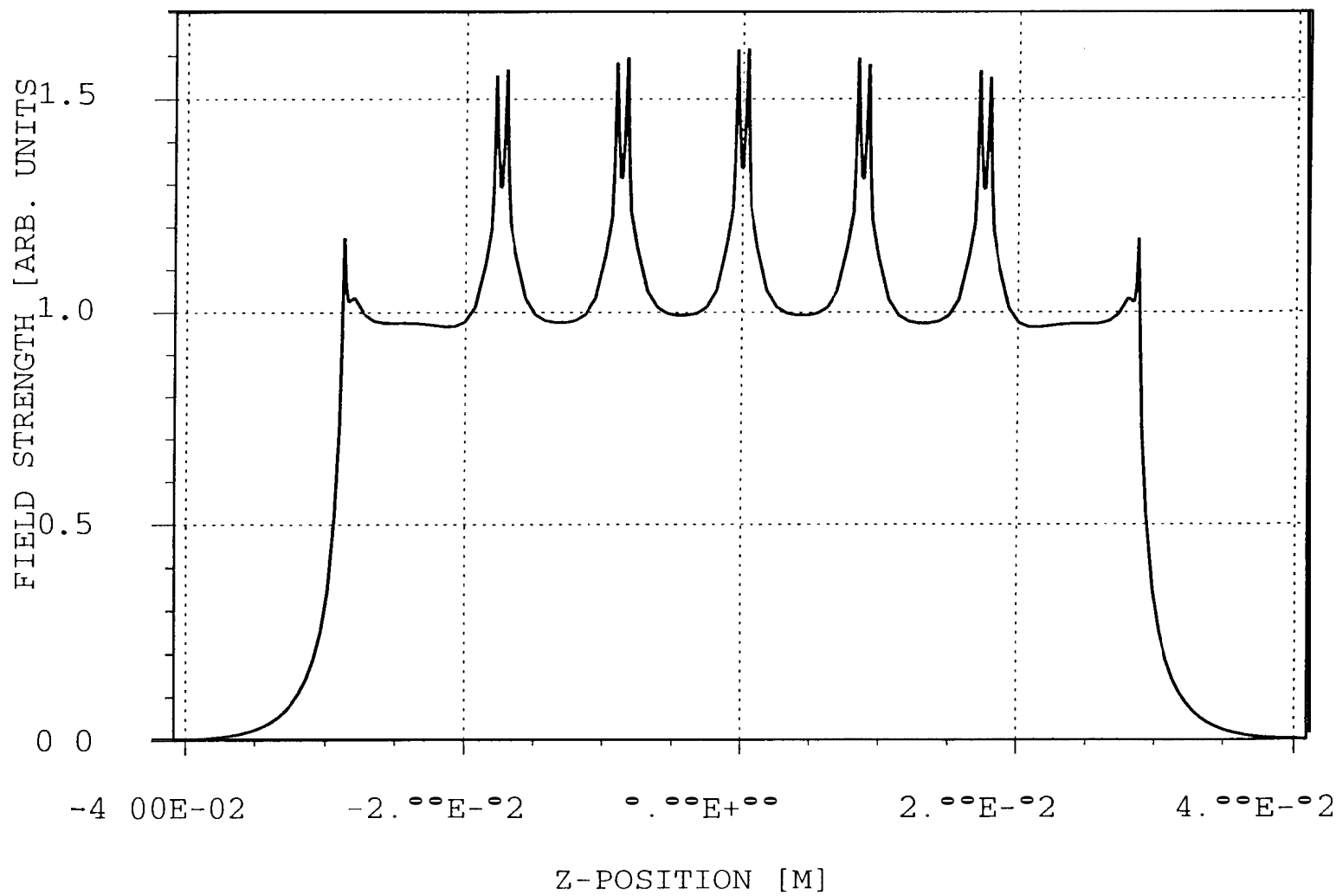
ORDINATE: EALLMAG
COMPONENT: -

FIXED COORDINATES:
DIM.....MESHLINE
X 22
Y 1
T 146212

ABSCISSA: GEOMTIME
[BASE OF EALLMAG]

REFERENCE COORDINATE: Z
VARY.....MESHLINE
FROM 1
TO 177

TOTAL E-FIELD MAGNITUDE VS Z



Modifications Investigated -

① Increase a_c. This works.

It induces a phase deficiency ~ 10°.

② Increase b in cell adjacent to coupler to compensate for phase error. This undid most of what had been gained

③ All of the above but also eliminate quadrupole effect. This does work but barely.

④ Reduce b in cell adjacent coupler. For case tried this introduced a 60° phase deficiency, but otherwise worked well

[illegible]

MAFIA

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#ARROW

COORDINATES/M
FULL RANGE / WINDOW
X[-.026875, .011898]
[-.026875, .011898]
Y[0000, .032703]
[:0000, .0327031
Z[-.011319, .072569]
[^.0043750, .0043750]

SYMBOL = B2
t-MESHLINE: 30
CUT AT Z/M: 4.37500E-03
INTERPOLATE.= 1
LOGSCALE....= 0.00000E+0
[TIME.....: 37733
TIME.....: 1.49778E-08
MAX ARROW = 2.33135E-05

FRAME: 5 14/12/99 - 08:55:16 VERSION[V4.020]

FREQUENCY/HZ 1.1424000000000E+10

T3'. DRC

RDDS INPUT COUPLER

MAGNETIC INDUCTION IN TESLA