Using FE codes : have a good basis on paper

1st : be sure of the requirements

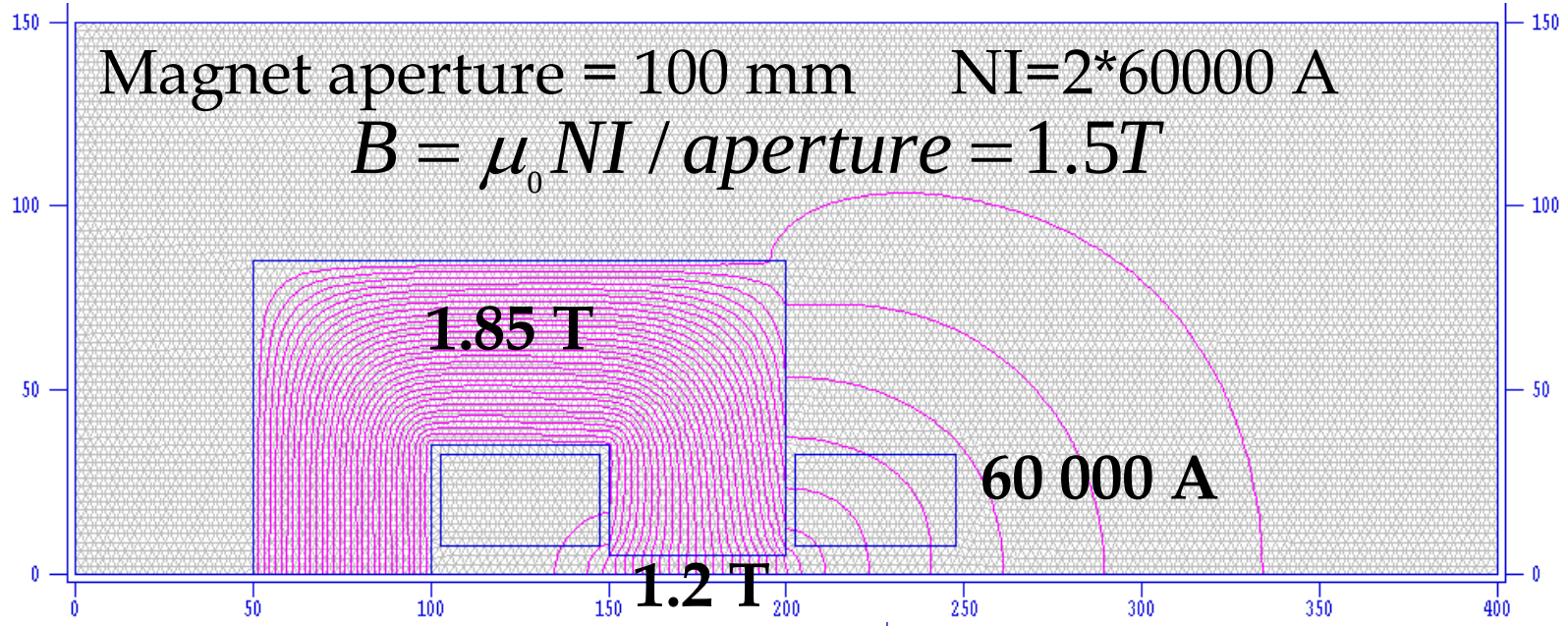
2nd: set tentative pole width

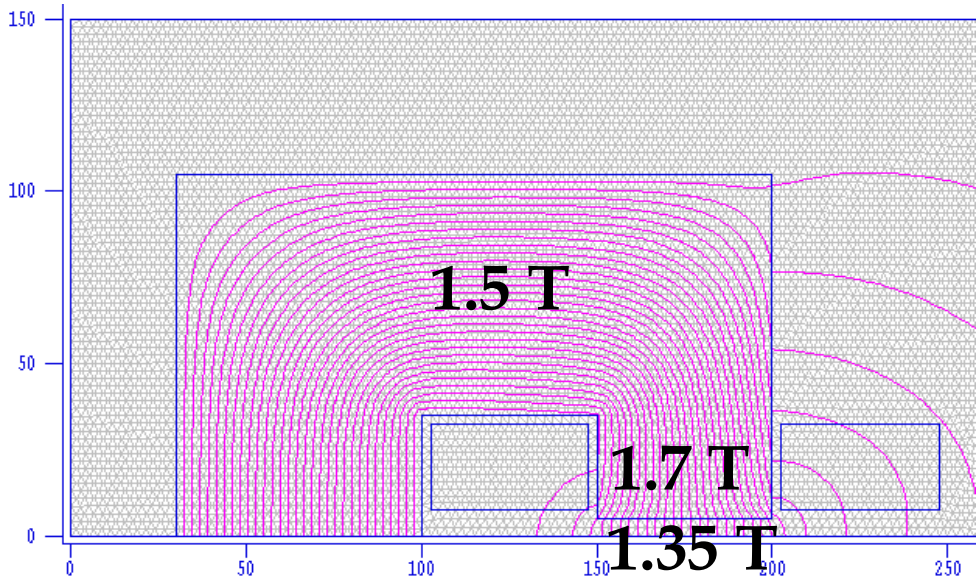
3rd: add coils

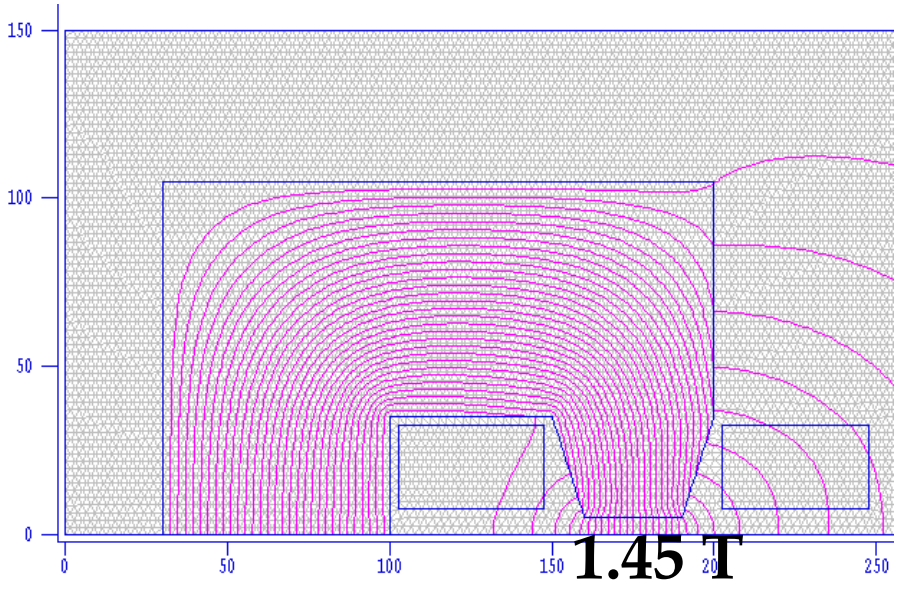
4th: draw cross section

5th: use FE code

Non linearities







Running Poisson

Input file XX.am

- Title
- Problem type, variables & analysis
- Definition of external boundaries
- Definition of regions
- Definition of material properties

Batch file

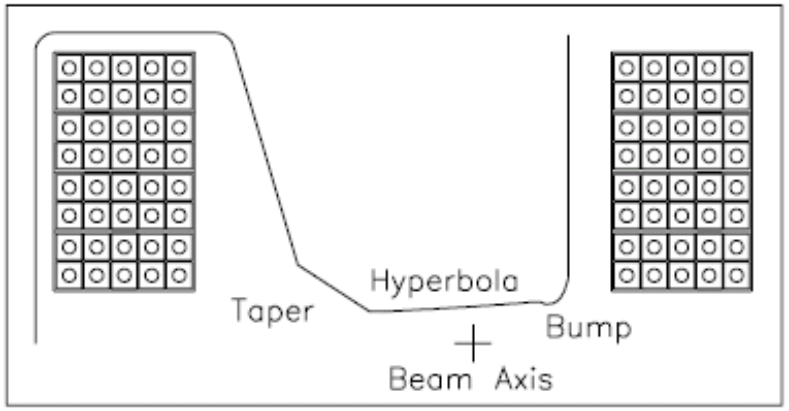
- Runs Automesh
- Runs Pandira

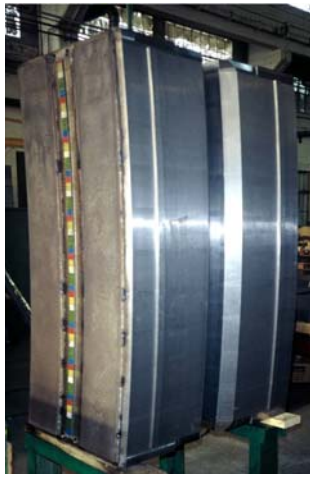
Output files

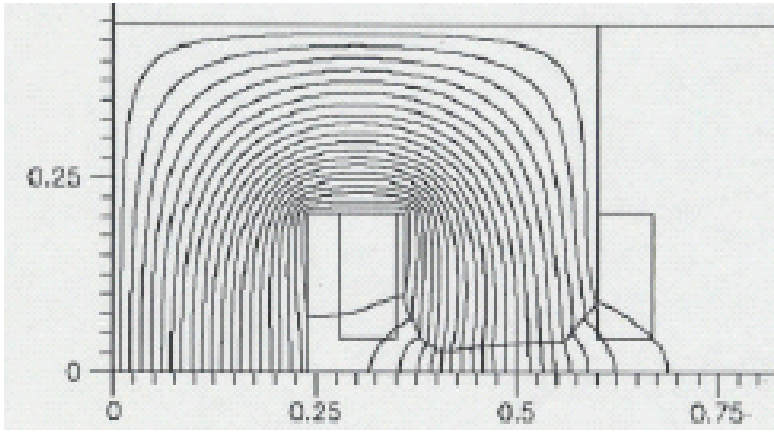
- Outpan.txt : fields/harmonic
- XX.T35 : graphical field map
- Outpan.tbl ; field plot

```
CAS Case Study Base File

&reg kprob=0              ; Poisson or Pandira problem
mode=0                    ; Some materials have variable permeability
dx=0.5                    ; Mesh interval in x
dy=0.5                    ; Mesh interval in y
Ienergy = 1.              ; Calculate stored energy
yminf=0.,ymaxf=25.        ; Y range for field interpolation
xminf=0.,xmaxf=30.      ; X range for field interpolation
; The next 6 terms refer to the harmonic analysis:
ktype=6                   ; H-Dipole symmetry
nterm=9                   ; Number of coefficients
nptc=49                   ; Number of arc points for interpolation
xorg=0.                   ; Origin of the expansion
rint=1.5                  ; Radius of the arc for interpolation
angle=90.                 ; Angular extent of arc (default start = 0)
rnorm=1.5 &               ; Aperture radius for normalization

&po x= 0.0,y= 0.0 &      ! World
&po x=15.0,y= 0.0 &
&po x=25.0,y= 0.0 &
&po x=30.0,y= 0.0 &
&po x=30.0,y=25.0 &
&po x= 0.0,y=25.0 &
&po x= 0.0,y=20.0 &
&po x= 0.0,y= 2.0 &
&po x= 0.0,y= 0.0 &

&reg mat=1,cur=30000 & ! Coil
&po x= 7.5,y= 2.5 &
&po x=14.5,y= 2.5 &
&po x=14.5,y= 9.5 &
&po x= 7.5,y= 9.5 &
&po x= 7.5,y= 2.5 &

&reg mat=2,mtid=1 & ! Iron yoke
&po x= 0.0, y=  2.0 &
&po x= 7.0, y=  2.0 &
&po x= 7.0, y= 10.0 &
&po x= 15.0, y=10.0 &
&po x= 15.0, y= 0.0 &
&po x= 25.0, y= 0.0 &
&po x= 25.0, y=20.0 &
&po x=  0.0, y=20.0 &
&po x=  0.0, y= 2.0 &

&mt mtid=1                        ! Iron properties
bgam=0.00000  0.0017513135
0.11420E+04   0.0017513135
0.29530E+04   0.0010159504
0.51140E+04   0.0007821666
0.84760E+04   0.0007078644
```

Some combined function magnets for SLS





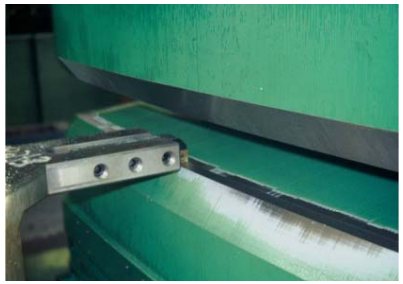


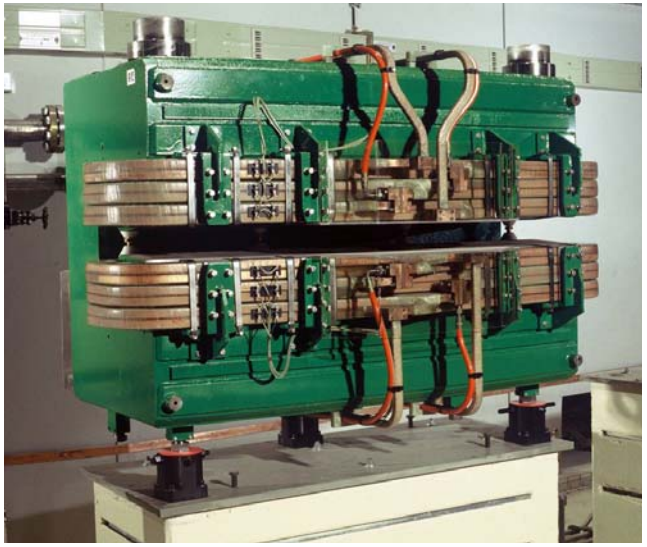
Canadian light source CLS

Gap = 45 mm B= 1.35 T G= 3.8T/m

Italian light source ELETTRA

Gap = 70 mm B= 1.22 T G= 2.8T/m

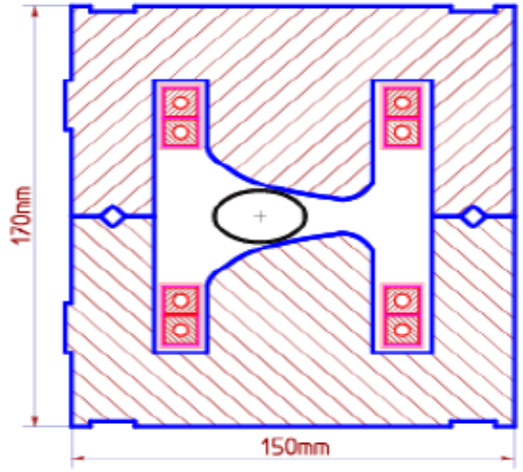


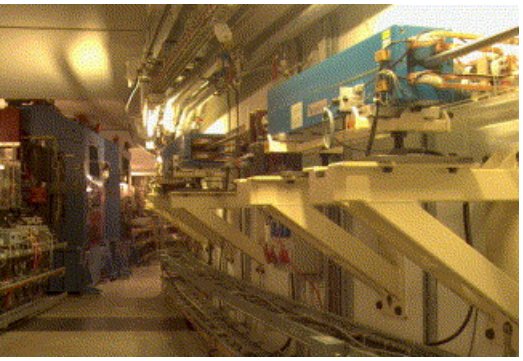


Some combined function magnets for SLS

SLS Booster

Gap=60 mm
B_0= 0.16 T
B_1=4 .7 T/m
B_2=7 T/m^2





ALS Storage Ring

Gap=50 mm
B_0= 1.5 T
B_1=6 T/m

SRRC Storage Ring

Gap=52 mm
B_0= 1.2 T
B_1=1.7 T/m

SPEAR3 Storage Ring

Gap=50 mm
B_0= 1.4 T
B_1=3.6 T/m