Diamond-II Booster Magnets

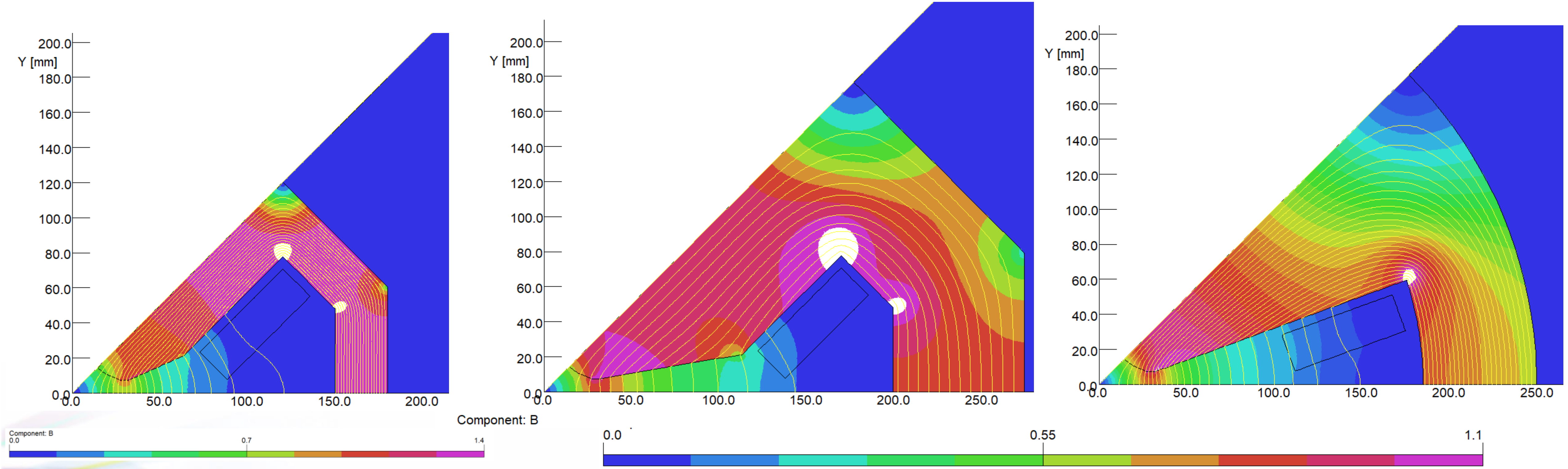
Type	B-field, T	Quadrupole gradient, T/m	Sextupole field, T/m^2	Magnetic length, m	Bend radius, m	Bend angle, mrad	Aperture radius, mm	GFR radius, mm	Number
Quadrupoles		30.0		0.45			20.4	17.8	20
Defocusing dipoles	0.9875	-8.14	-43.76	1.30	11.8229	109.9557	14	11	38
Normal dipoles	0.9536			1.25	12.2427	102.1018	14	11	4
Focusing dipoles	0.4232	11.1158	36.8774	1.30	27.5869	47.1239	14	11	36
Sextupoles			300.0	0.05			14	11	44

+ 48 vertical and 48 horizontal corrector magnets (max. bend angle 0.8 mrad)

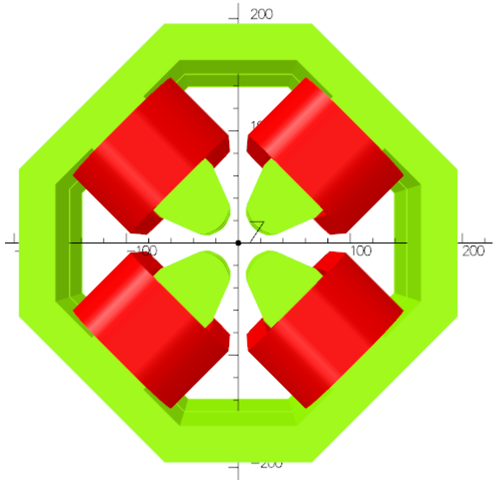
Quadrupoles

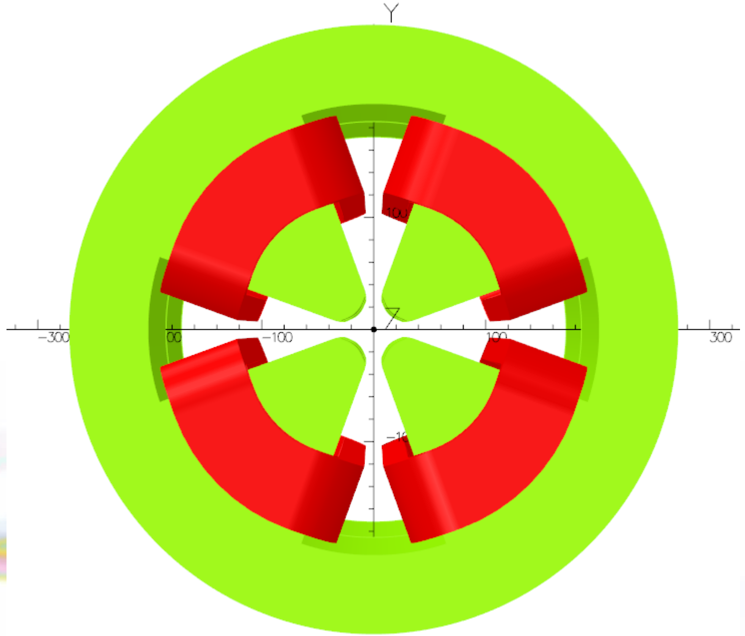
The issue of transfer function linearity

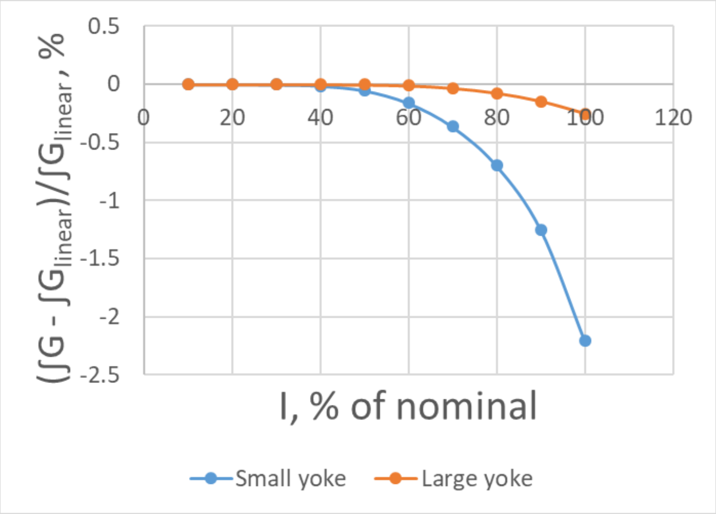
Max. B in the yoke 1.4 T	Max. B in the yoke 1.1 T	Max. B in the yoke 1.1 T
Yoke area ~ 7200 mm^2	Yoke area ~ 22000 mm^2	Yoke area ~ 19000 mm^2

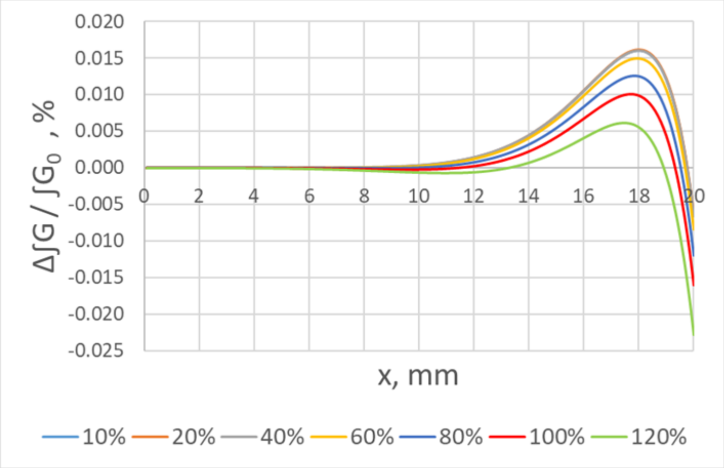


Quadrupoles

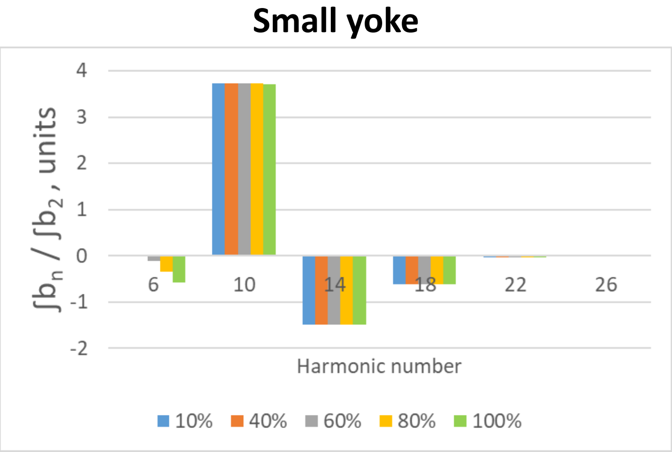


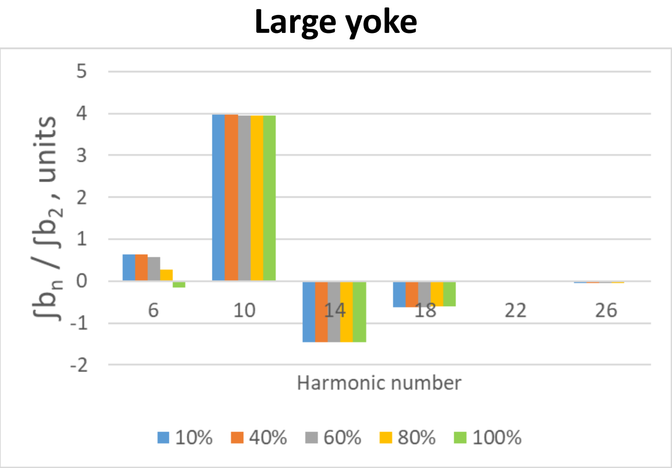




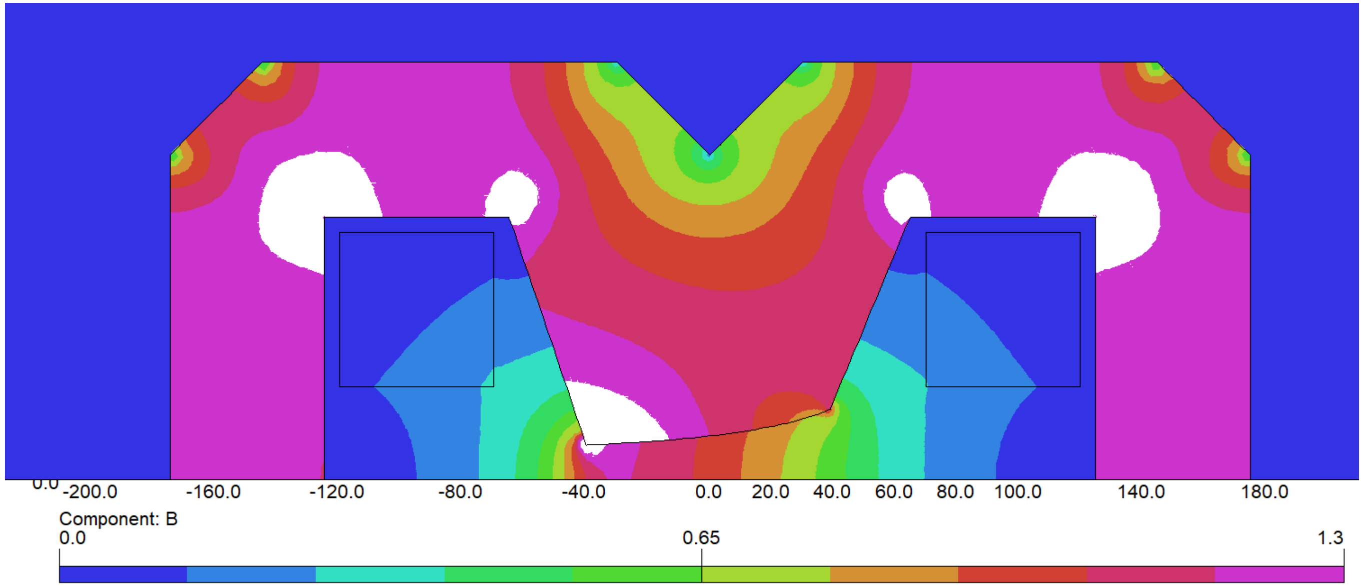


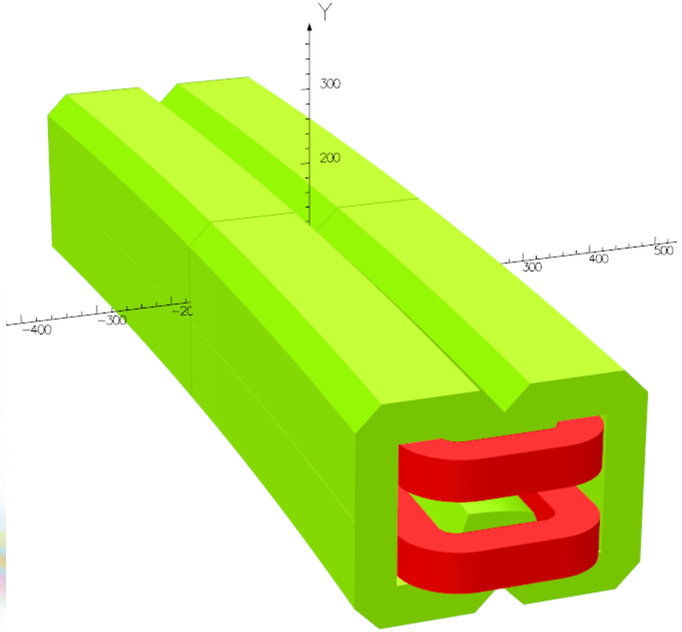
Integrated relative harmonics at 87% of the aperture

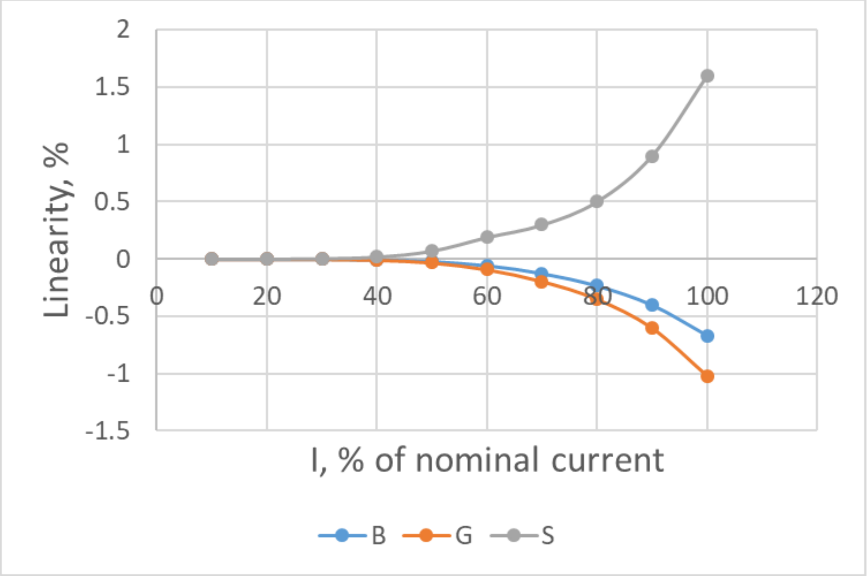




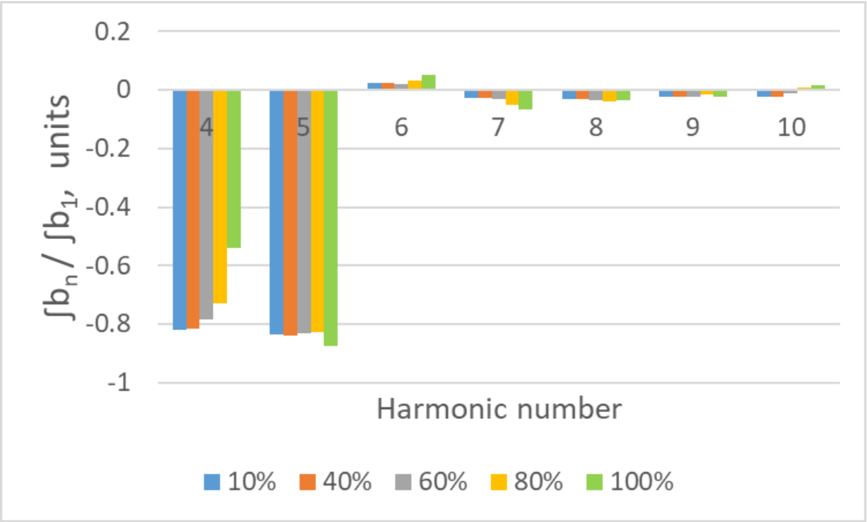
Defocusing dipoles



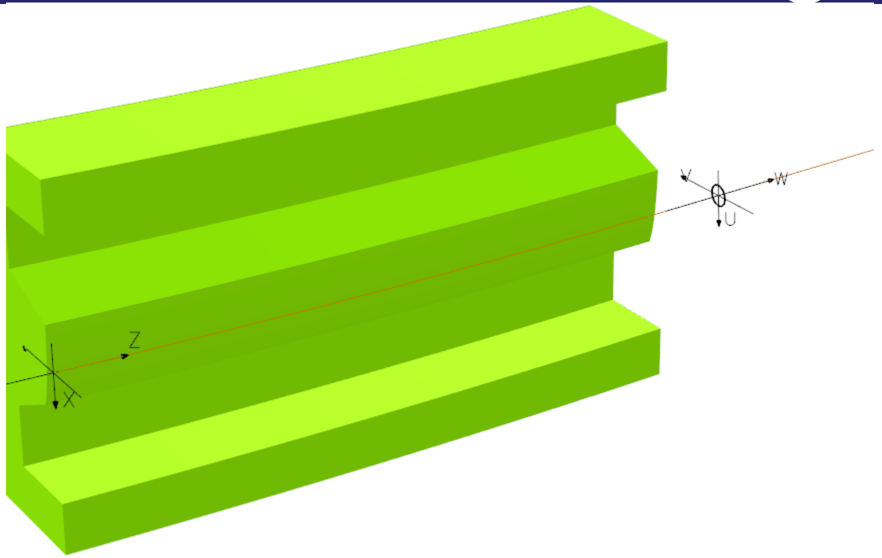


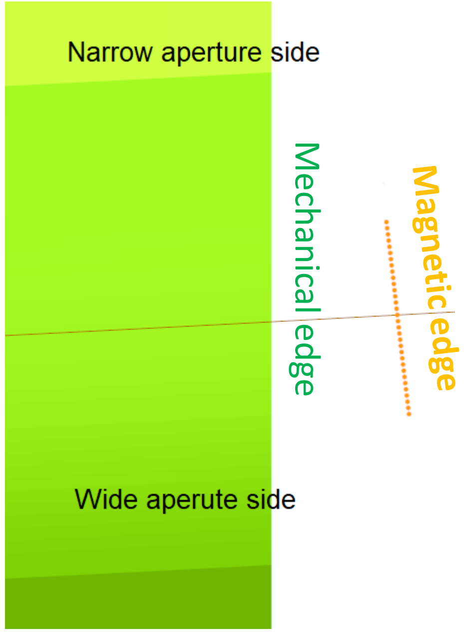


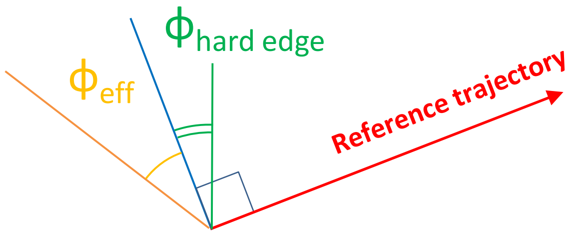
Integrated relative harmonics at 79% of the aperture



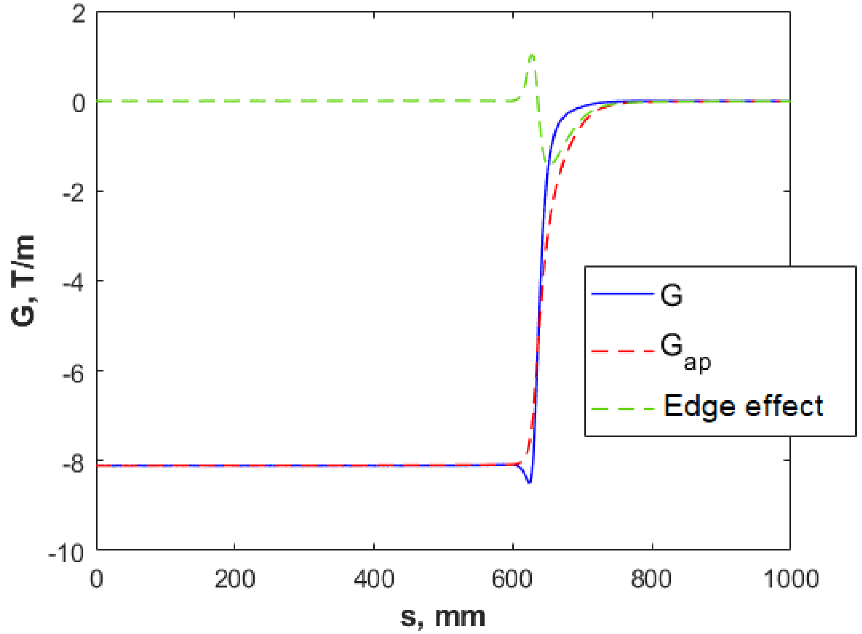
Edge focusing correction







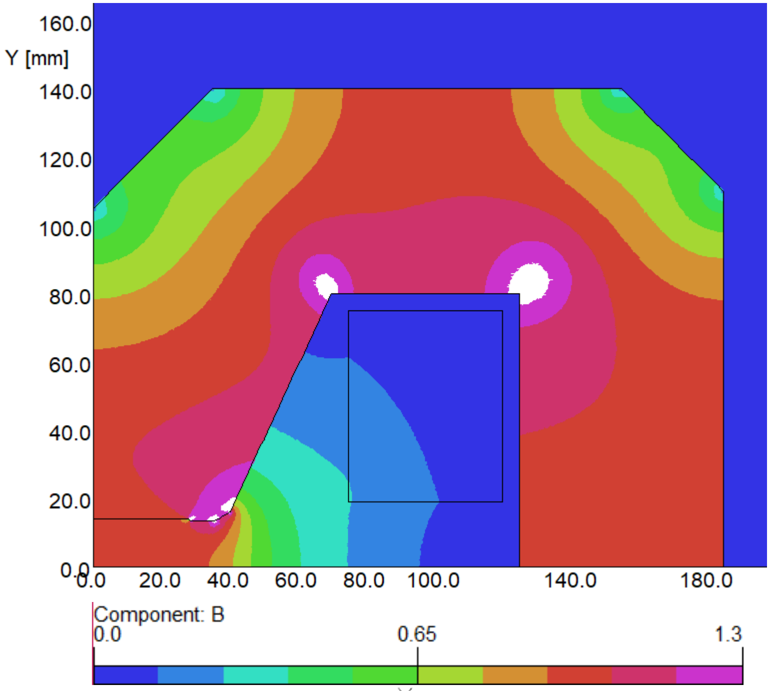
$$M = M_{edge} \cdot M_{sect} \cdot M_{edge}$$

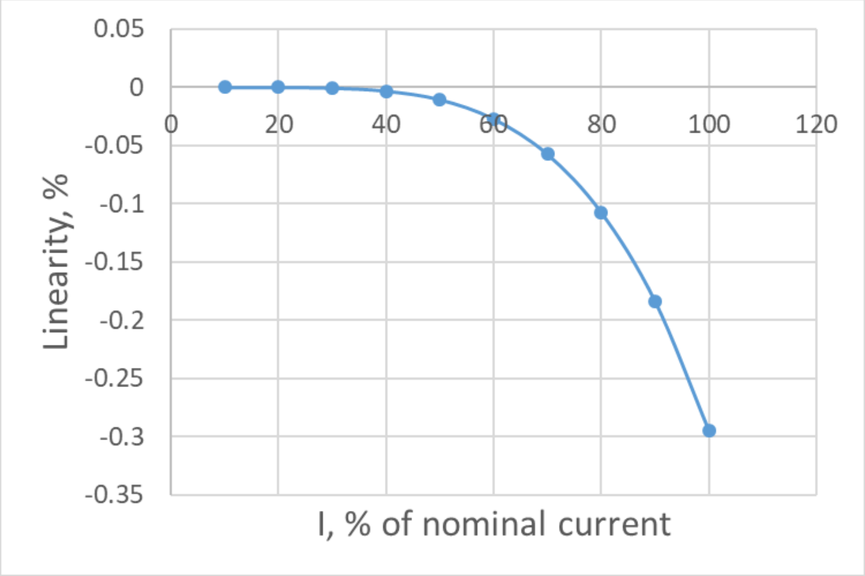


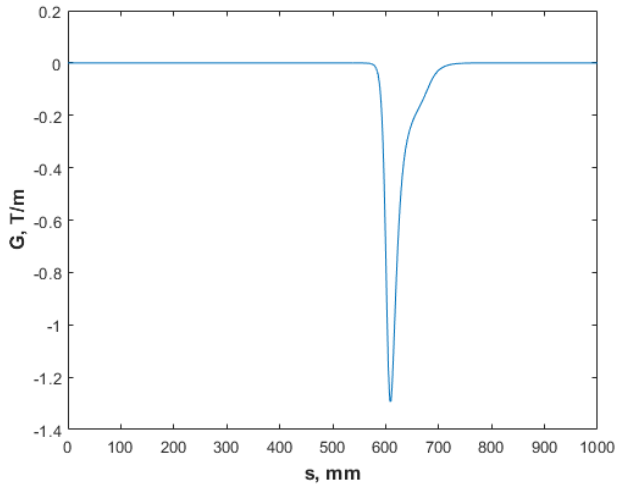
$$\int G_{ap} ds = \int G ds + 2 \tan(\phi_{eff})\, B$$

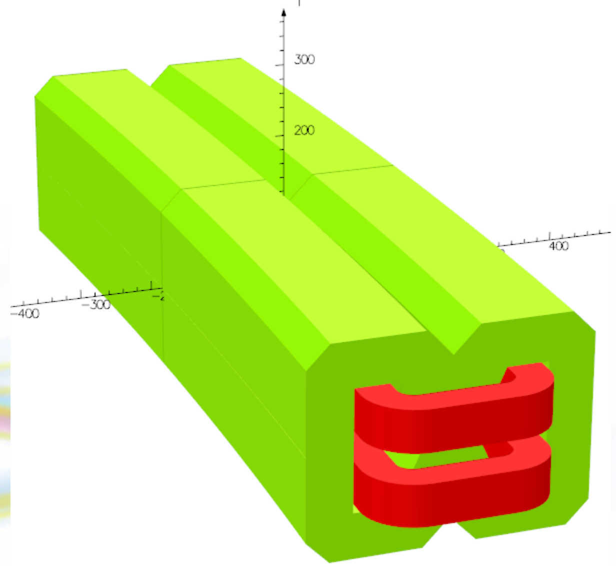
$\phi_{hard\ edge}$	3.15°
ϕ_{eff}	- 3.22°
$\phi_{acc.\ phys.}$	- 3.54°

Normal dipoles

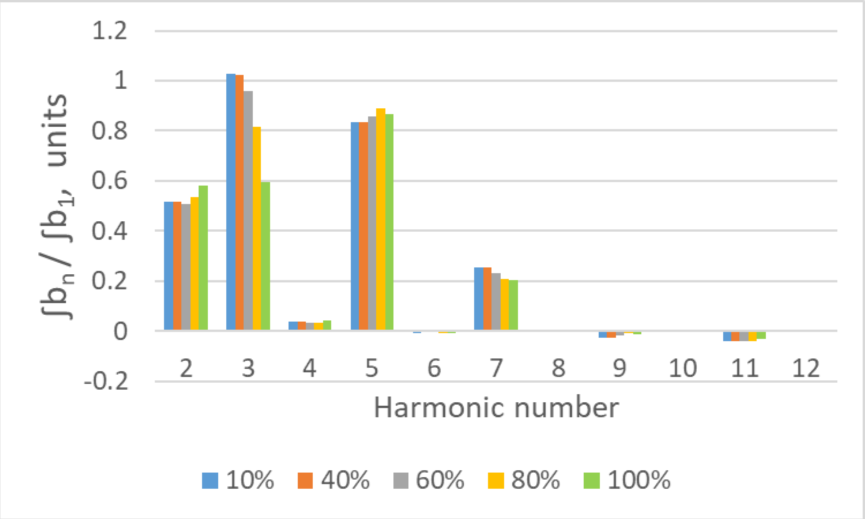


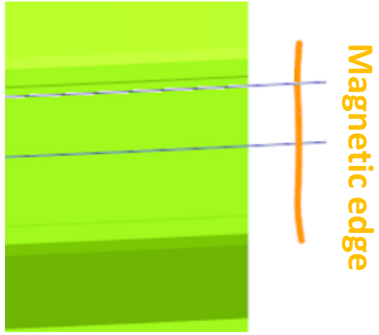






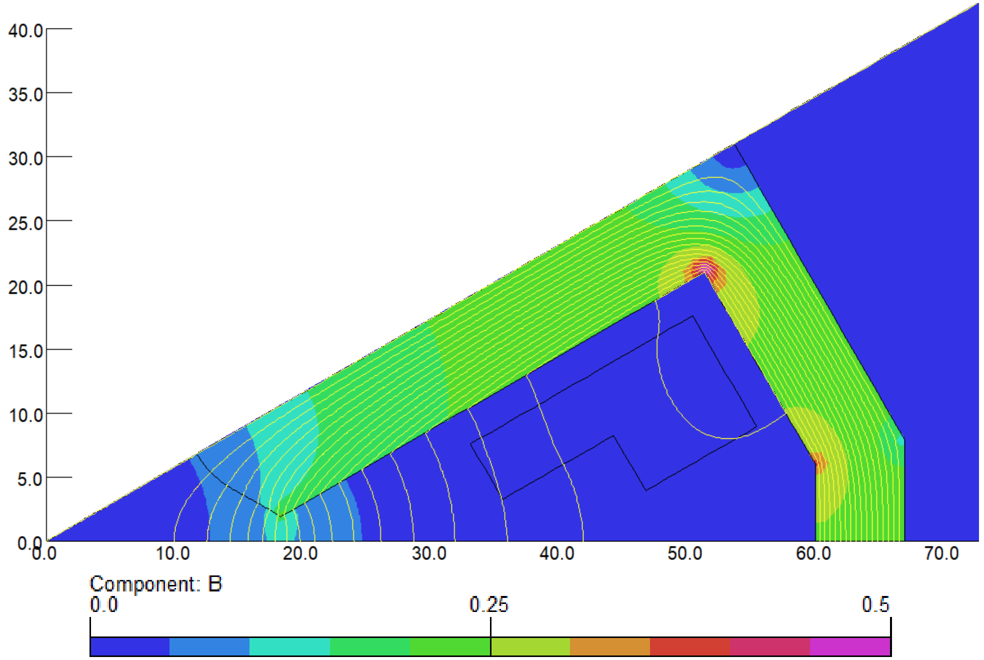
Integrated relative harmonics at 79% of the aperture



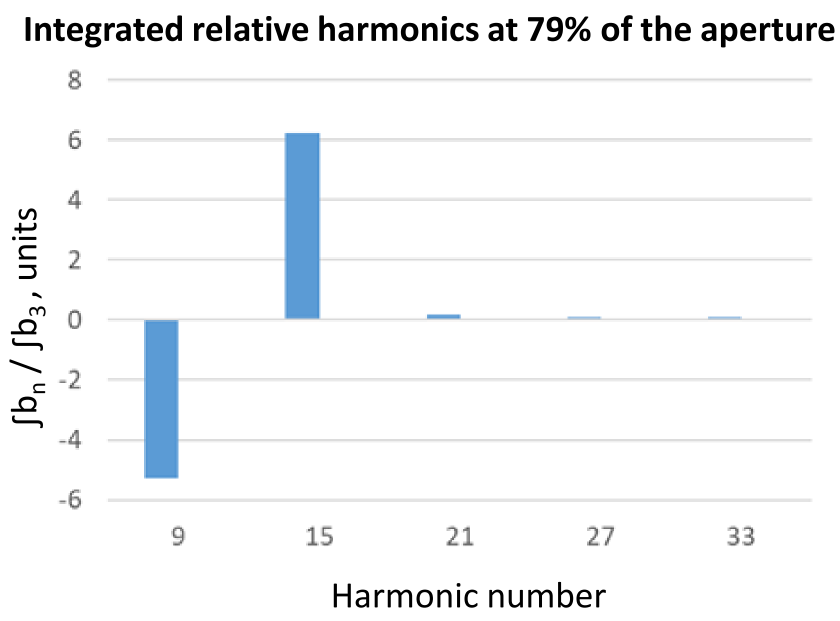


$\phi_{hard\ edge}$	2.93°
ϕ_{eff}	2.69°
$\phi_{acc.\ phys.}$	2.71°

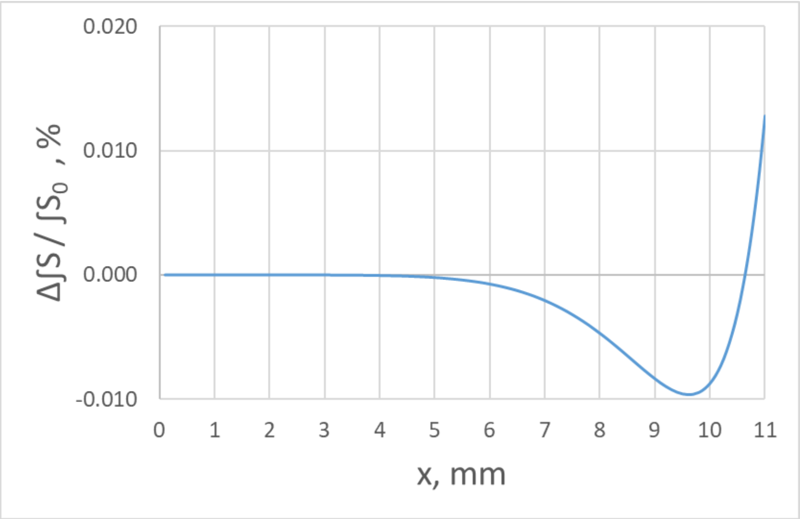
Sextupoles



40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Component: B
0.0
0.25
0.5



Integrated relative harmonics at 79% of the aperture
8
6
4
2
0
-2
-4
-6
9
15
21
27
33
$\int b_n / \int b_3$, units
Harmonic number



0.020
0.010
0.000
-0.010
0 1 2 3 4 5 6 7 8 9 10 11
$\Delta\int S / \int S_0$, %
x, mm