Big Magnet Design II:

a) solenoid and cable concept
b) short section test

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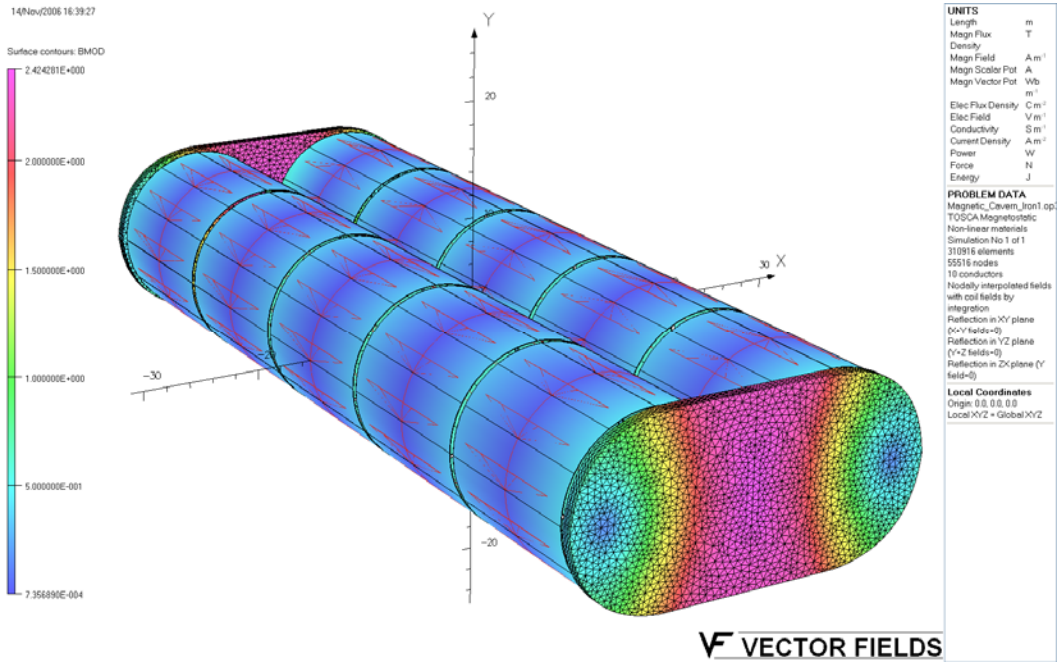
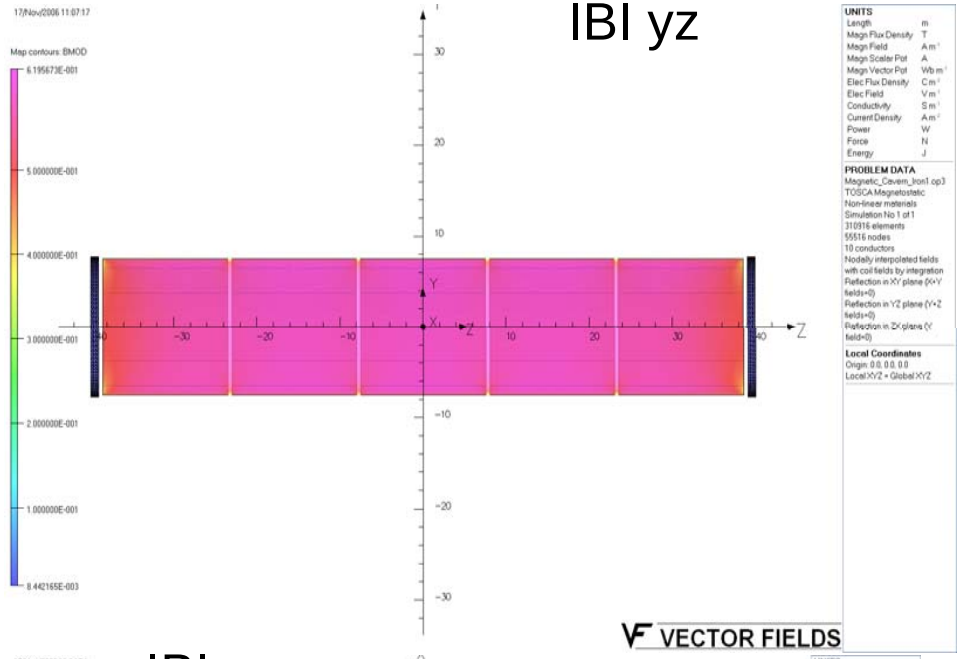
Magnetic cavern design II

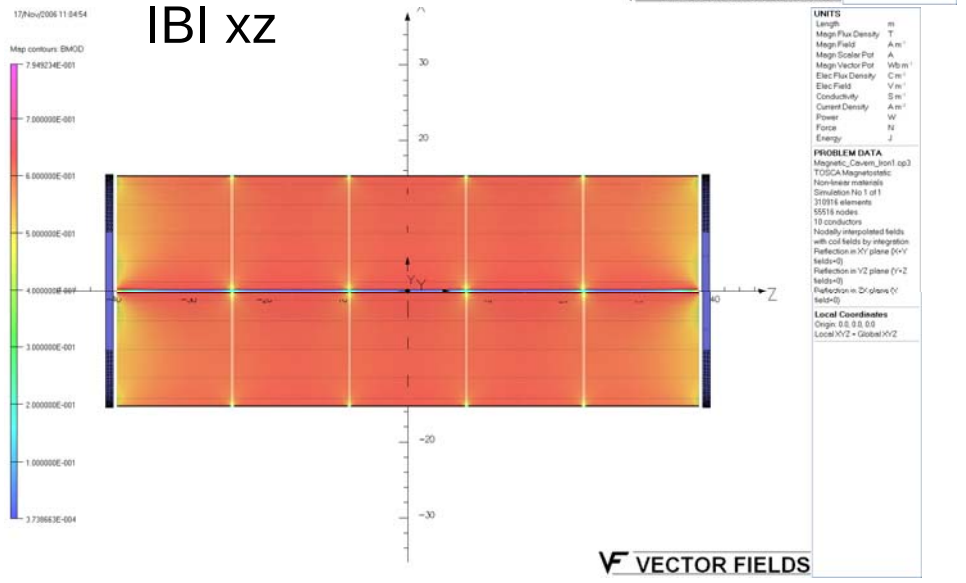
Fields



IBI yz



IBI xz



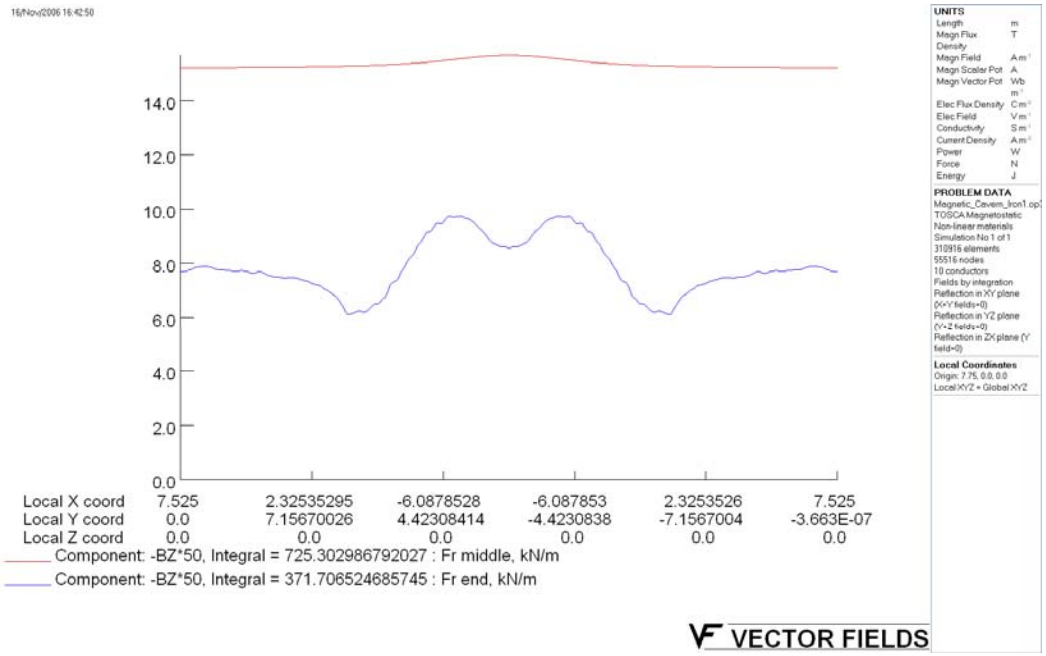
1 m iron wall thickness.

~2.4 T peak field in the iron.

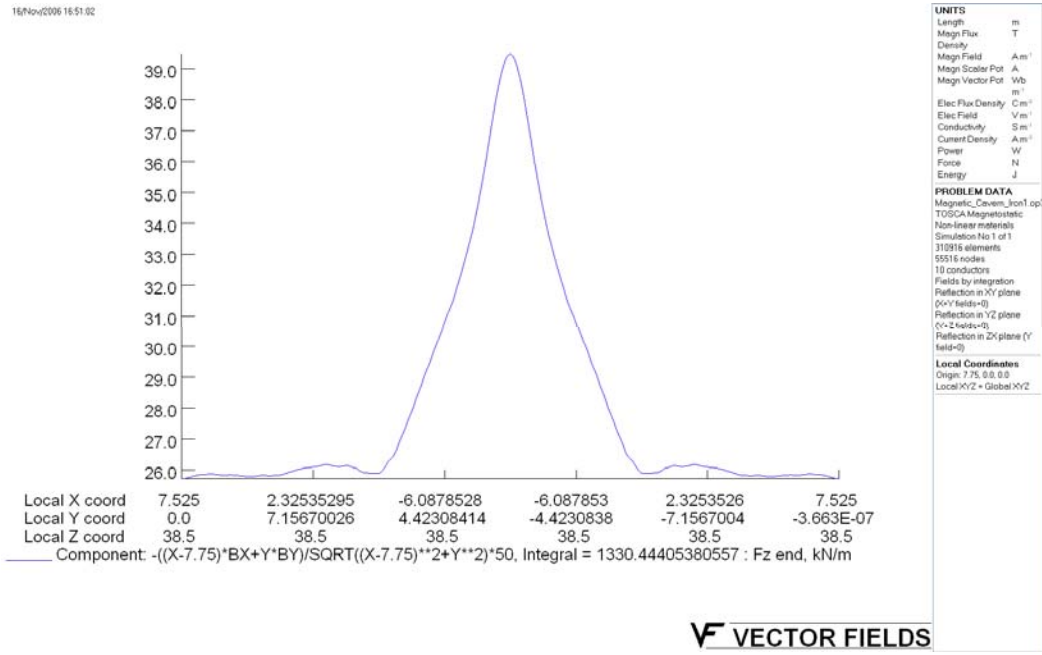
Good fielduniformity

Fr and F_z

Fr (middle/end turns)



Fz (end turns)

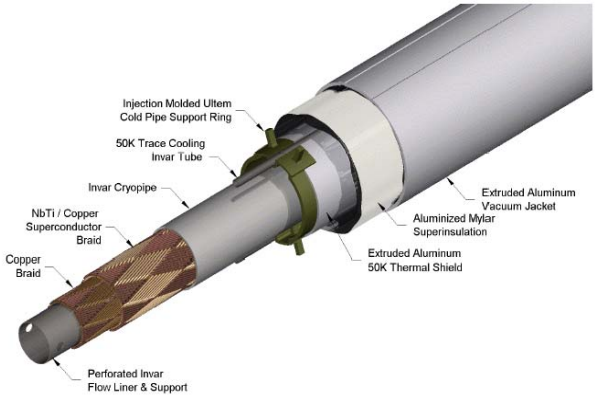


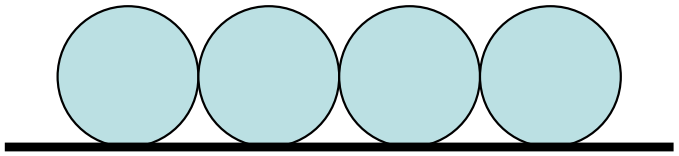
The largest force component => drives the mechanical design.

Parameters

PARAMETER	UNIT	DESIGN
		With iron
$I_{solenoid}$	MA	7.5
N_{turns}/solenoid		150
I_{turn}	kA	50
$\|B\|_{average}$ in XZ	T	0.579
W_{total}	GJ	3.95
L_{total}	H	3.16
F_r maximum	kN/m	15.67
F_x maximum	kN/m	39.57

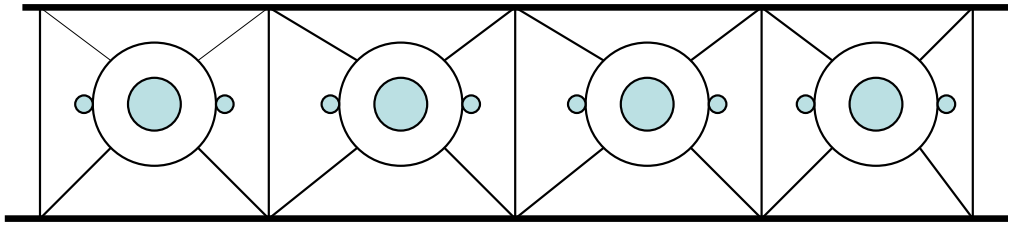
Original Solenoid and cable design





- Pipetron type cable
  - Needs modification to provide long length (~5-7 km) and flexibility (bending diameter 15 m)
- Solenoid strongback
- Assembly procedure

New support structure and cable



Structure:

- Cable vacuum shell is now part of the solenoid support structure

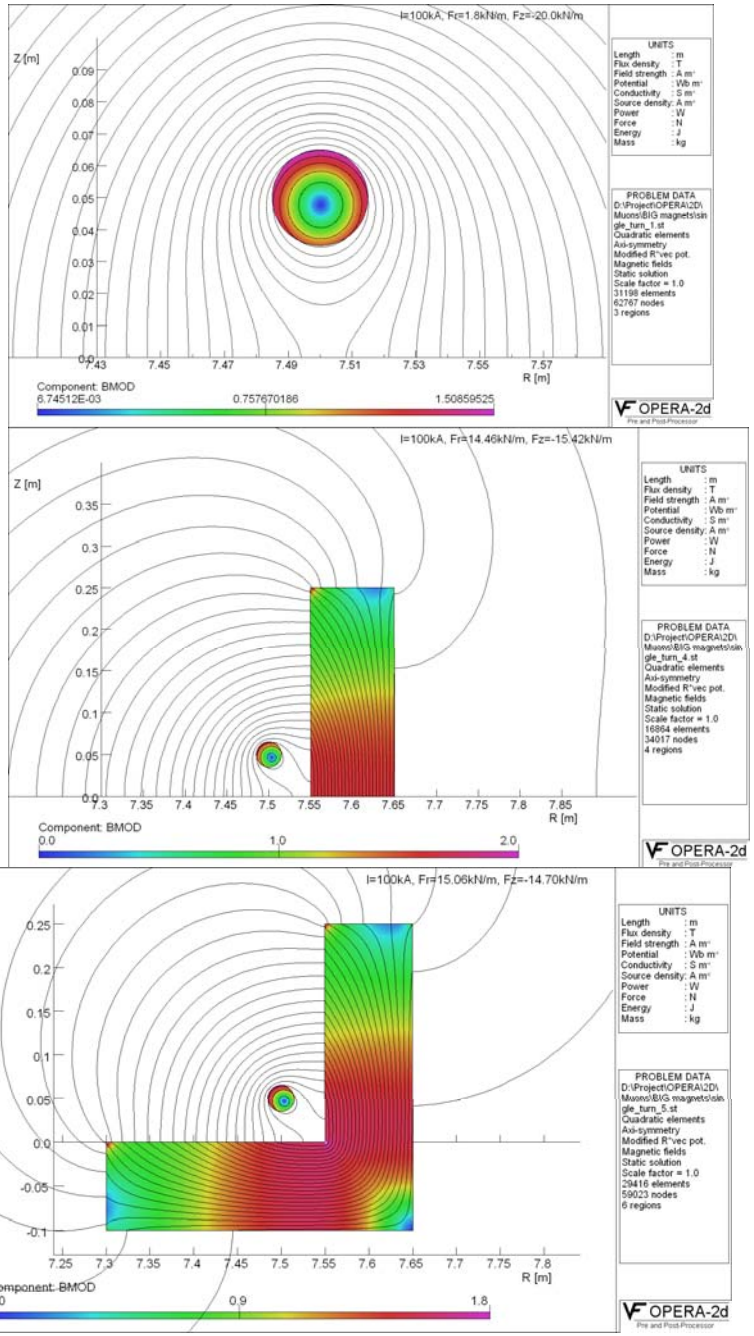
LN shield is fabricated and installed independently:

- two half-shells with LN pipes
- super-insulation,
- supports

Cable installed inside the LN shield:

- thick He pipe with SC and Cu wires wound outside
- thick Al or Cu tape (mechanical support and additional stabilizer) wrapped over SC/Cu wires
- superinsulation
- flexible (+/-2 mm dynamic range) supports

1-2 turn solenoid model



Goals:

- Develop and optimize cable design, thermal shield, support structure, superinsulation
- Fabricate and test ~50m long cable and LN shield
- Test solenoid support structure and assembly procedure (thermal shield and cable installation)
- Cable splicing (mechanical, electrical)
- Test cable support structure mechanics (londitudinal and transverse):
  - Fr(body)~6-10 kN/m
  - Fr(end)~15 kN/m
  - Fz(end)~29-29 Kn/m
- Measurestatic heat leaks at different currents to LN and LHe levels

<=Single turn

Pipetron Magnet Test facility

- PS~100kA
- Current leads 100 kA
- Cryogenic system
- Quench detection and protection systems
- DAQ

Next step:

- Check the availability of this equipment and space
- Experiment plan, schedule and cost estimate