

PAUL SCHERRER INSTITUT



B. Auchmann (CERN/PSI), L. Brouwer (LBNL), S. Caspi (LBNL), R. Felder (PSI), J. Gao (PSI), G. Montenero (PSI), M. Negrazus (PSI), G. Rolando (CERN), S. Sanfilippo (PSI), S. Sidorov (PSI)

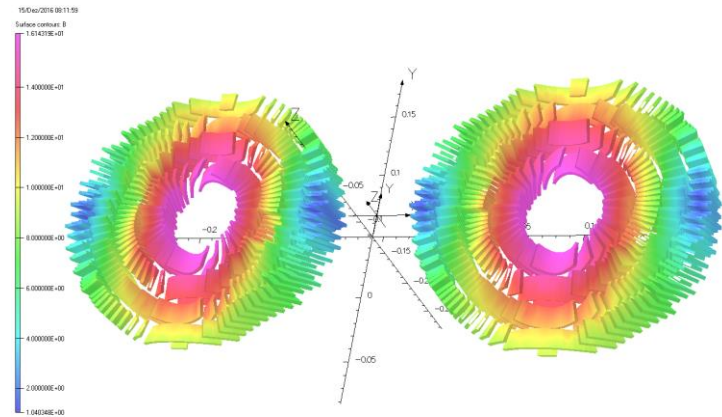
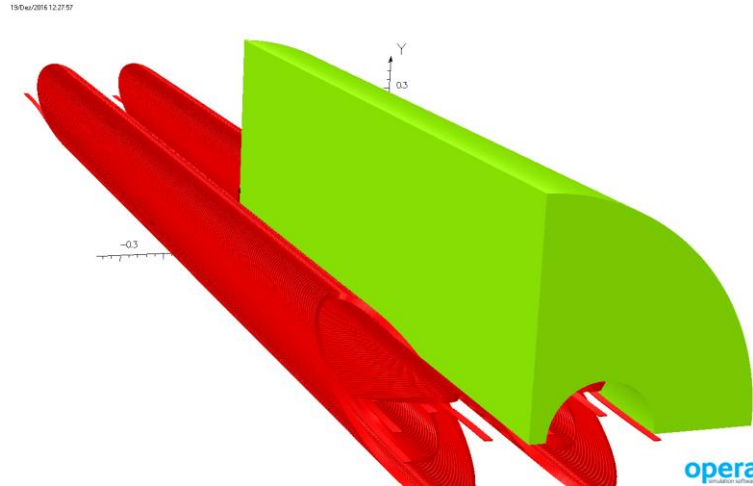
Thoughts on 3D Mechanical Design

17.04.2018, EuroCirCol Meeting 36, CERN.

Work supported by the Swiss State Secretariat for Education, Research and Innovation SERI.



Export Lorentz forces via comi script in barycenters of ANSYS coil mesh.

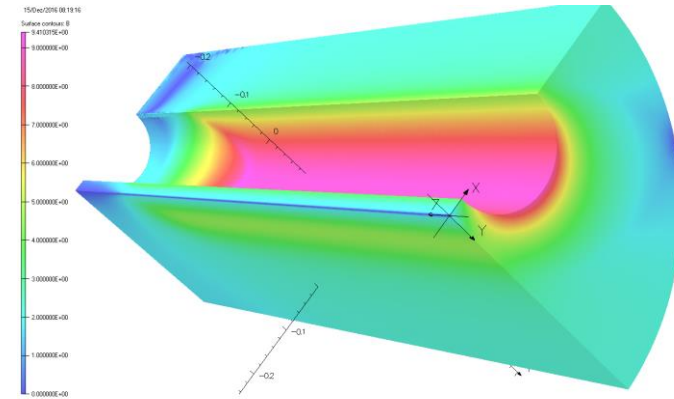


```

UNITS
length m
Mag Flux Density T
Integrated Field A/m
Mag Scalar Pot A
Current Density A/m^2
Power W
Force N

MODEL DATA
D:\C:\240\opra
Integration: (TOSCA)
Material material
Simulator No 1 of 1
911123 elements
268807 nodes
9600 conductors
Nodeid interpolated field
Activated in global coordinates
Reflector in XY plane (Z=0)
Reflector in XZ plane (Y=0)
Reflector in YZ plane (X=0)
Field Point Local Coordinates
Local = Global

FIELD EVALUATIONS
Line L18E (node) (1) Cartesian
x=0.125 y=0.0 z=0.0 to 1.5
    
```



```

UNITS
length m
Mag Flux Density T
Integrated Field A/m
Mag Scalar Pot A
Current Density A/m^2
Power W
Force N

MODEL DATA
D:\C:\240\opra
Integration: (TOSCA)
Material material
Simulator No 1 of 1
911123 elements
268807 nodes
9600 conductors
Nodeid interpolated field
Activated in global coordinates
Reflector in XY plane (Z=0)
Reflector in XZ plane (Y=0)
Reflector in YZ plane (X=0)
Field Point Local Coordinates
Local = Global

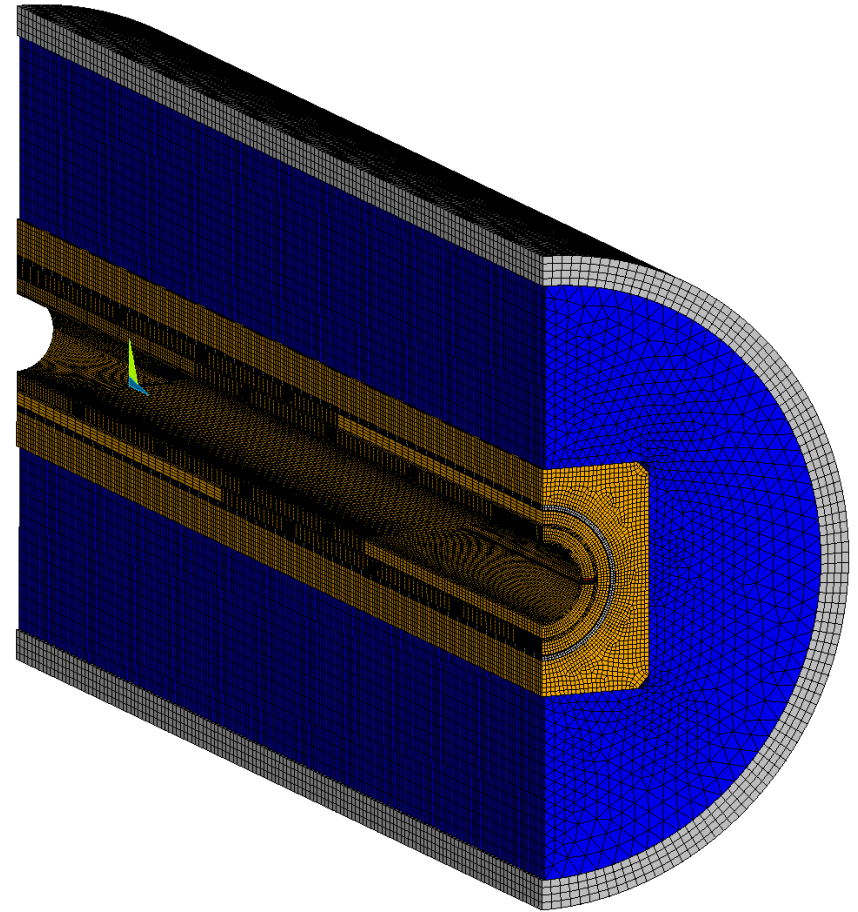
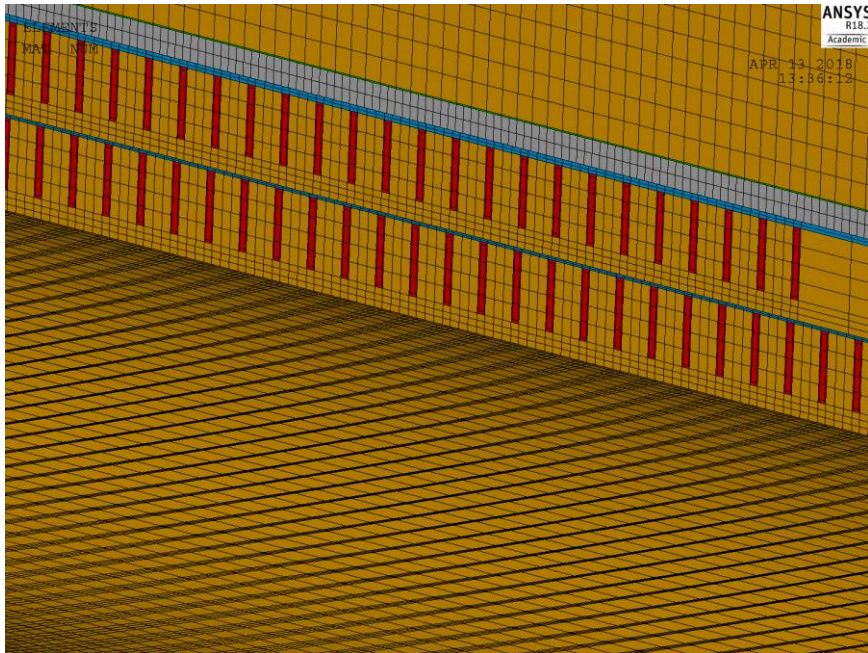
FIELD EVALUATIONS
Line L18E (node) (1) Cartesian
x=0.125 y=0.0 z=0.0 to 1.5
    
```



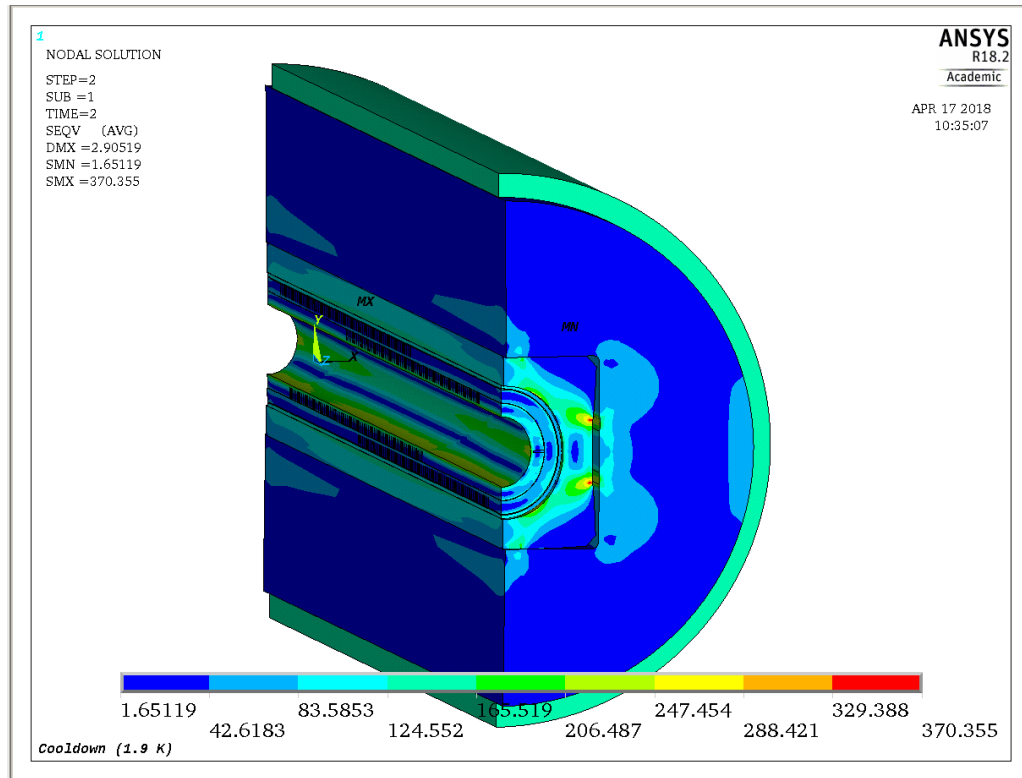
Courtesy M. Negrazus



- 3D coil and former model generated by L. Brouwer (LBNL).
- 3D mechanical structure added at PSI.



- Simulations under way on new work station.
 - Room-temperature and cool-down steps converged.





FCC 4-Layer CCT Design Criteria



- Former stresses.
- Cable axial strain.
- Cable transverse stress.
- Working assumption: coils do not require axial pre-load due to turn-by-turn transfer of Lorentz forces to former.

