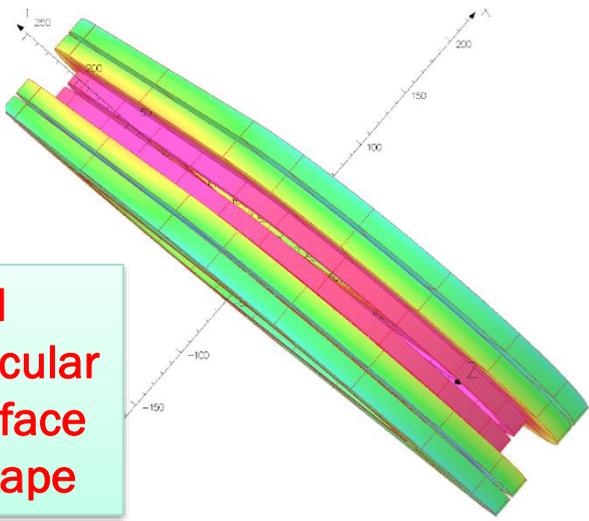


**Magnetization Measurements of the HTS
Coil in the HTS/LTS Hybrid Configuration
of US-Japan Program**

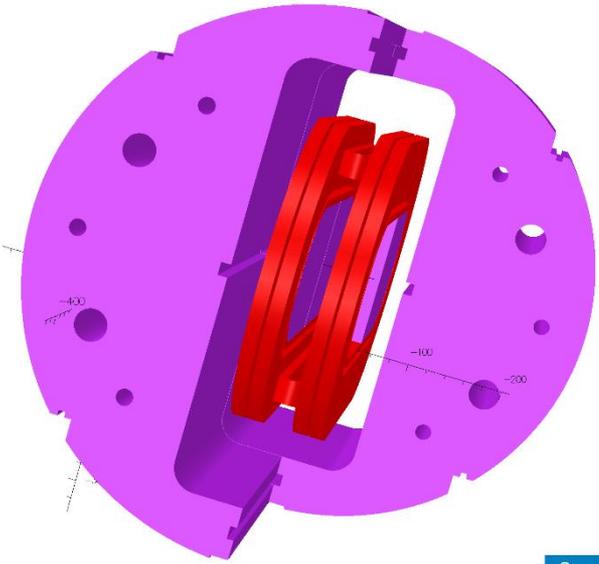
Ramesh Gupta

May 25, 2022

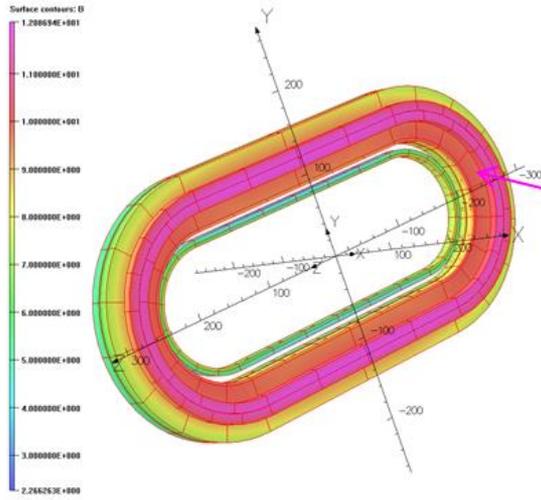
HTS Coil in HTS/LTS Hybrid Dipole (Field Perpendicular & Field Parallel)



**Field
Perpendicular
on wide face
of HTS tape**



**Field
Parallel
on HTS
coils**

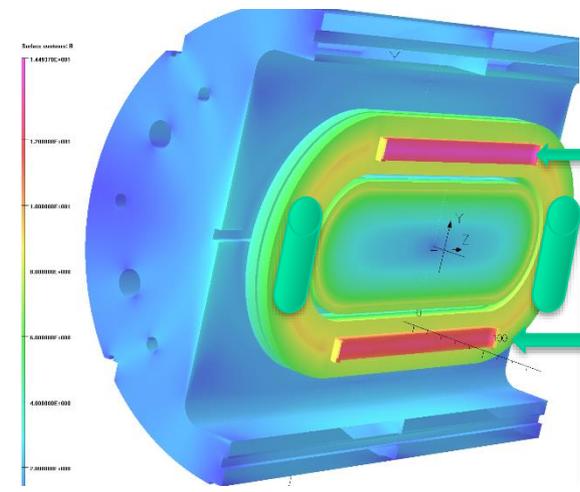


Mag Flux Density T	A/m
Mag Field A/m	A/m
Mag Scale Fact	1
Mag Vector Pot	100 mV
Mag Flux Density C/m	1
Mag Vector Pot	100 mV
Conductivity S/m	1
Current Density A/mm	1
Power W	1
Force N	1
Energy J	1
Mass kg	1

PROPS DATA
#0 conductors

Field Point Local Coordinates
Local = Global

HTS



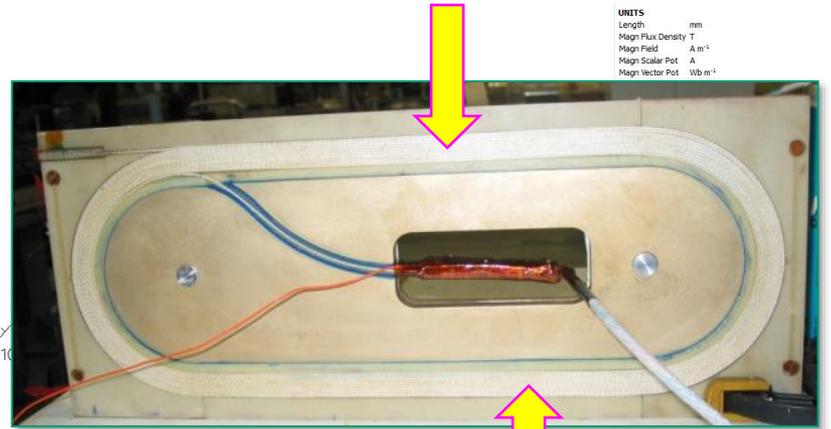
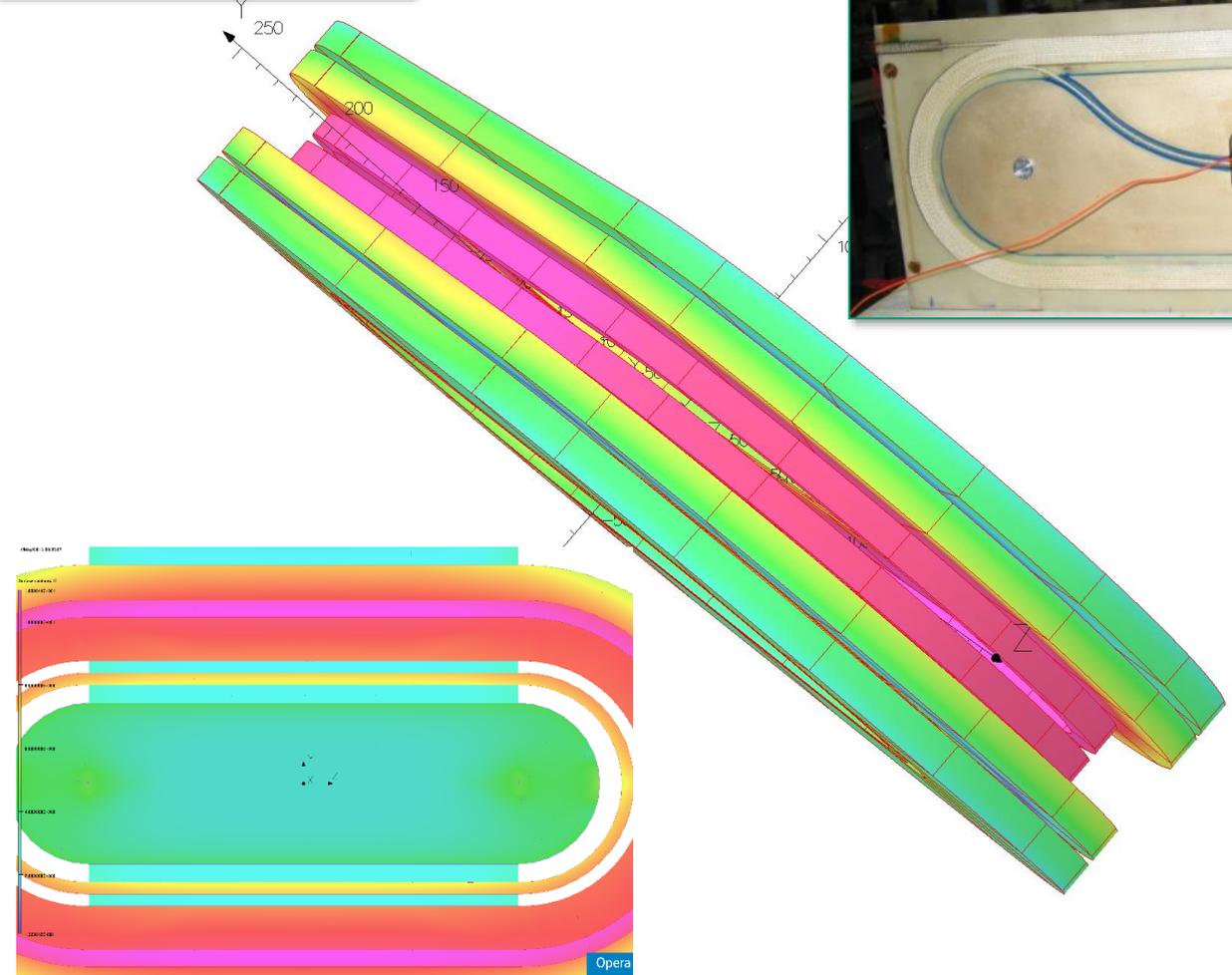
**HTS
Coil#1**

**HTS
Coil#2**

Test Insert Coils in Background Field (Field Perpendicular Configuration)

Used in SBIR

Surface contours: B
1.280136E+001
1.200000E+001
1.000000E+001
8.000000E+000
6.000000E+000
4.000000E+000
2.671198E+000



UNITS
Length mm
Magn Flux Density T
Magn Field A.m⁻¹
Magn Scalar Pot A
Magn Vector Pot Vb.m⁻¹

**Locations
of Hall
Probe**

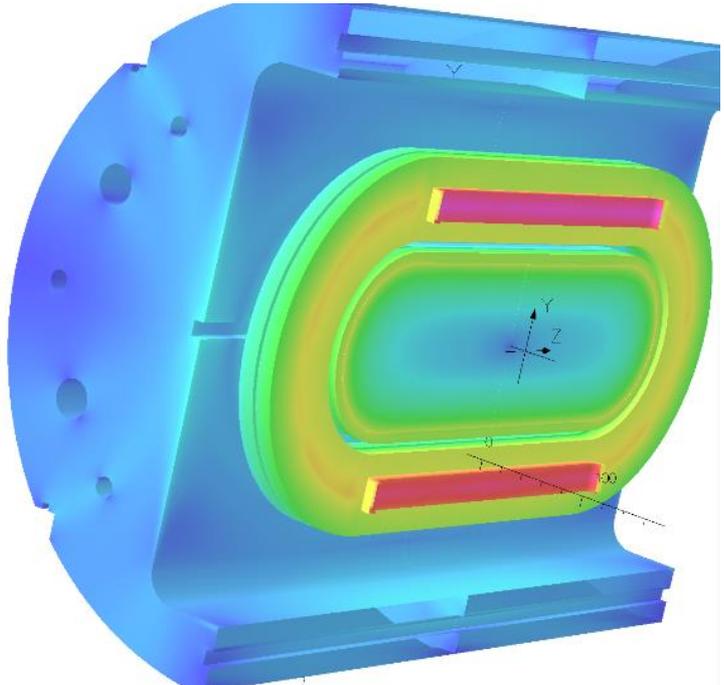
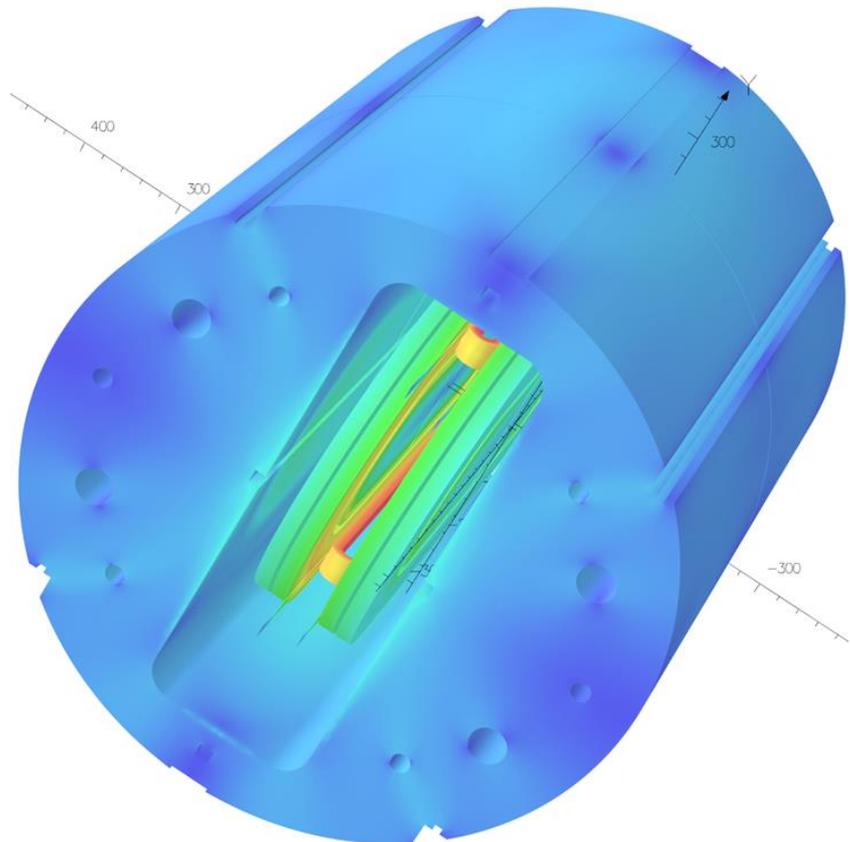
Opera

Test Insert Coils in Background Field (Field Parallel Configuration)

Used in MDP

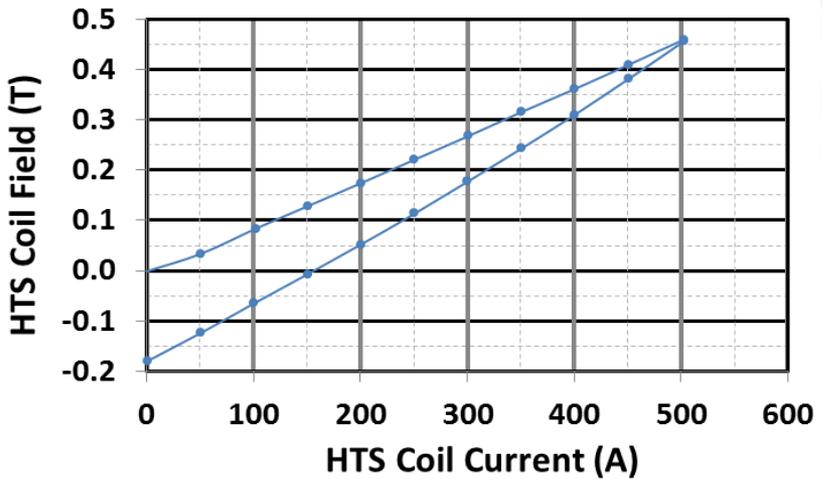


**Location of two Hall probes:
(a) at center, (b) at Edge**



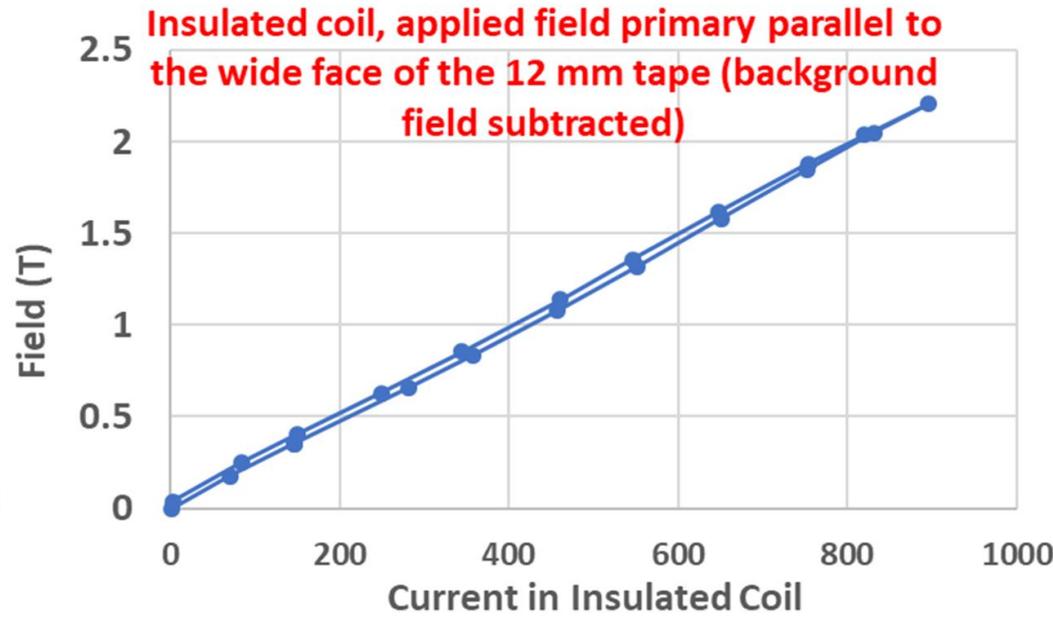
Magnetization Studies @2T Dipole Field

Field perpendicular (2016 SBIR)



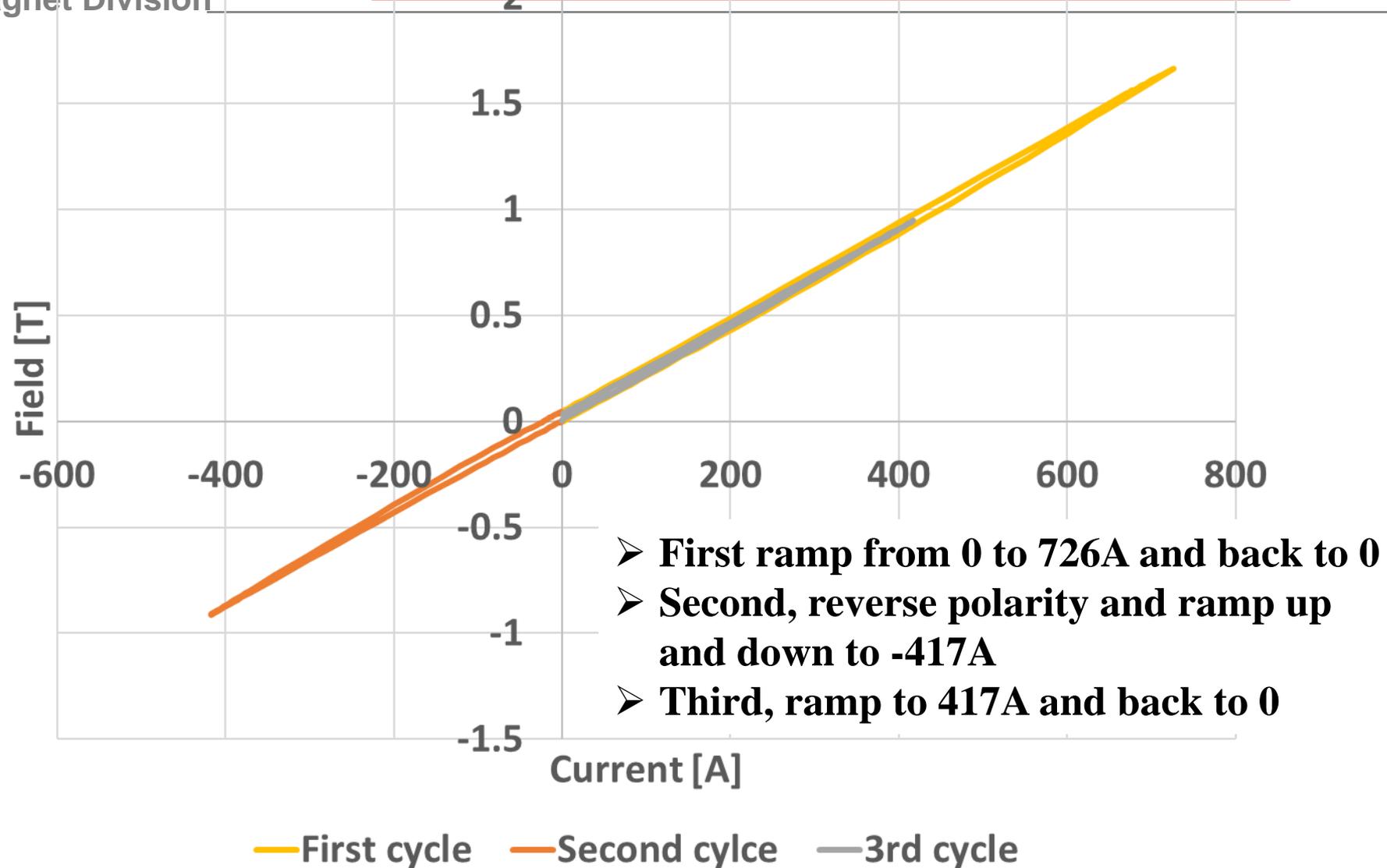
Additional field from the HTS coils in up and down ramp (offset to start from zero to start up-ramp)

Field parallel (2020 MDP)



Significant reduction in magnetization from HTS coils when field is primarily parallel to the wide face

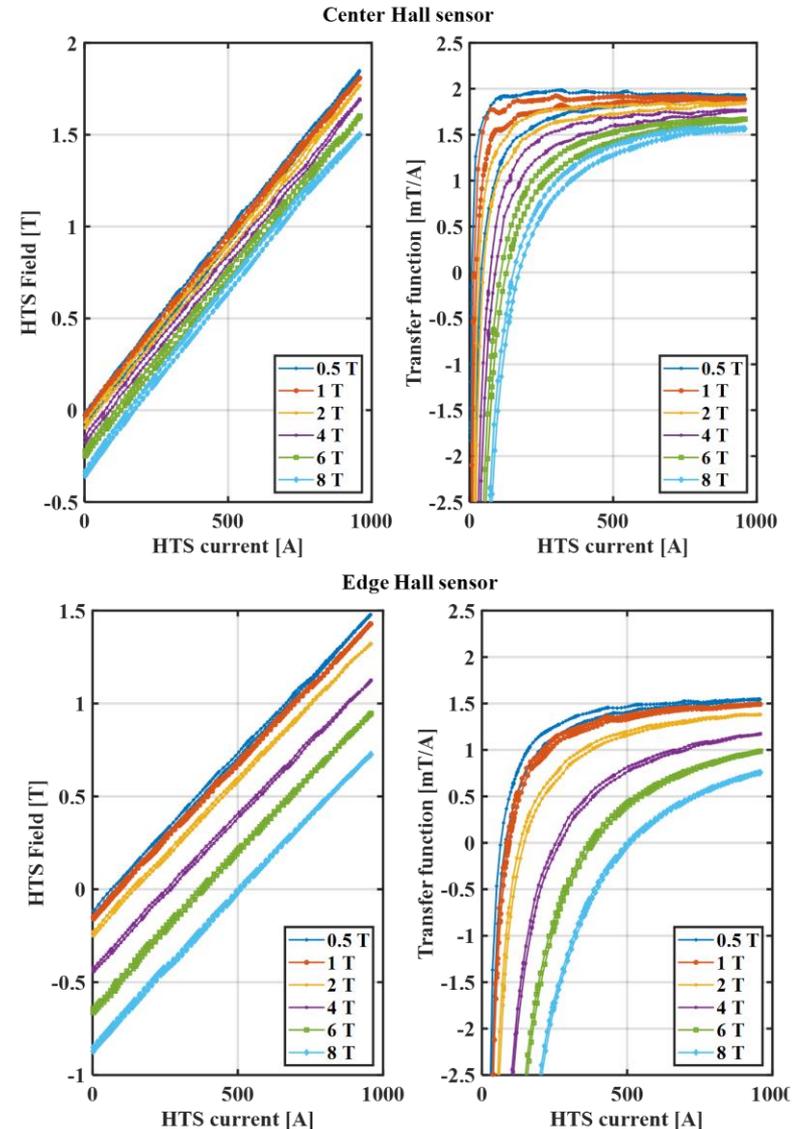
**HTS Magnetization Studies
(with no background field)**



HTS Magnetization Studies (background field primarily parallel)

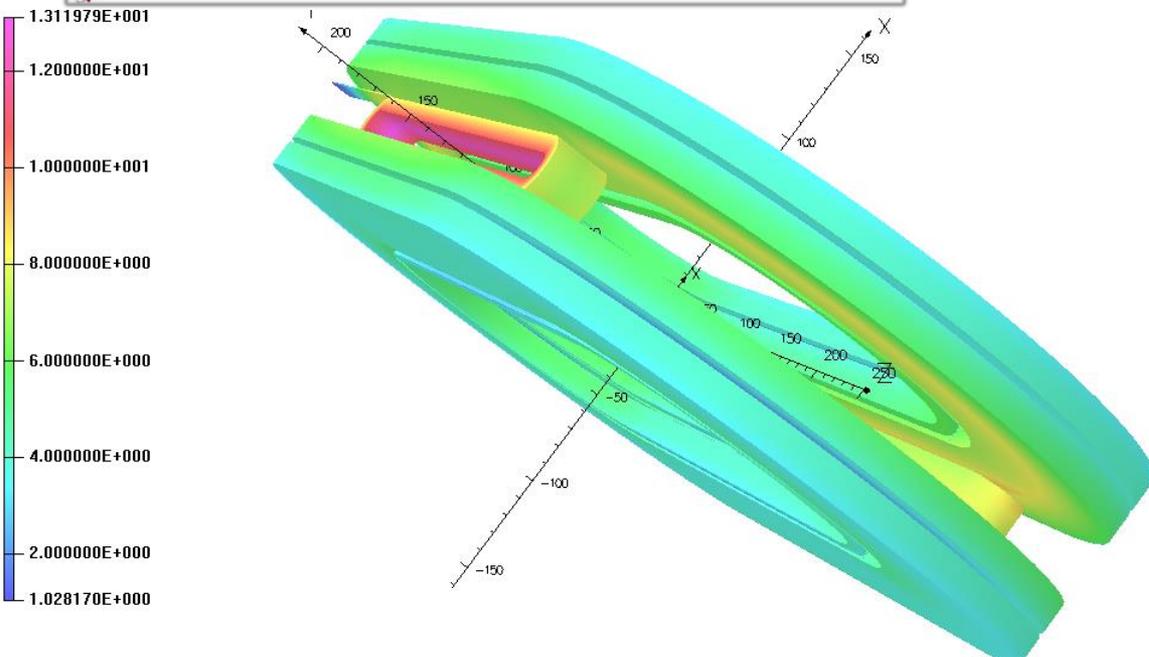
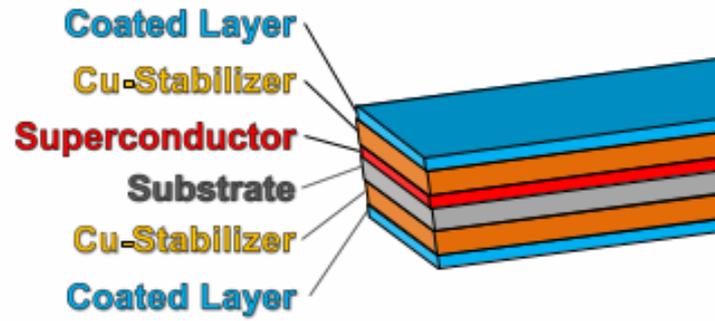
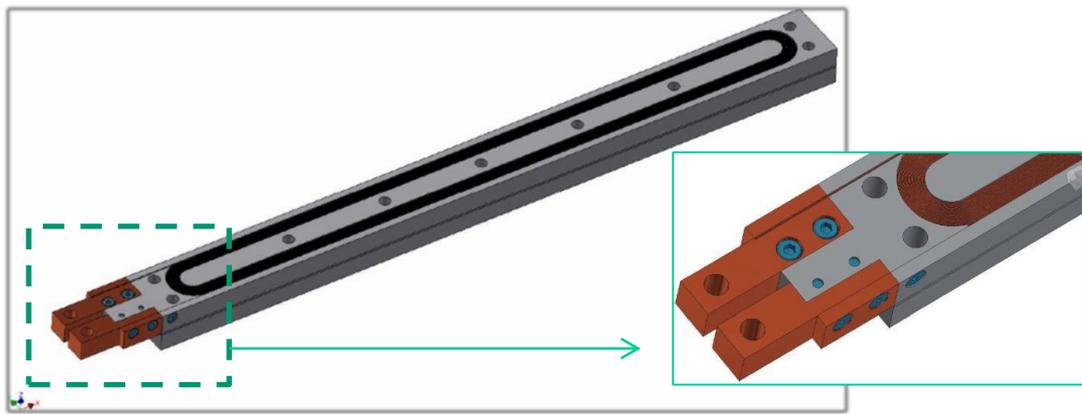
HTS/LTS Hybrid Tests:

- Hold LTS coils at 500 A, 1 kA, 2 kA, 4 kA, 6 kA, and 8 kA. For each background field from LTS, HTS coil is ramped up to 950 A and then back to 0
- The field is measured at two locations: at the center and also at the edge of the double pancake of the insulated coil



Configuration for US-Japan Test (both field parallel and field perpendicular)

HTS/LTS Hybrid Field, Quench and Magnetization Studies



Two Tests in One Go:
Two HTS insert coils in two apertures of the common coil dipole:

- Upper Bore: field primarily parallel
- Lower bore: field primarily perpendicular

Suggested Location of Hall Probes in US-Japan HTS Coils (double pancake)



Possible Locations (marked by X) of Hall probes: at the center, and at two edges of each pancake (5 locations) in SS, and one at the end

