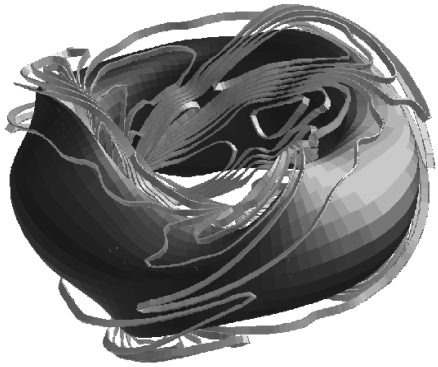
NCSX Memorandum



To: H. Kugel, M. Zarnstorff, H. Neilson, A. Brooks, S. Hirshman, L. Berry, D. Strickler, B. Nelson, M. Cole, D. Williamson, T. Brown, P. Heitzenroeder, A. Percival

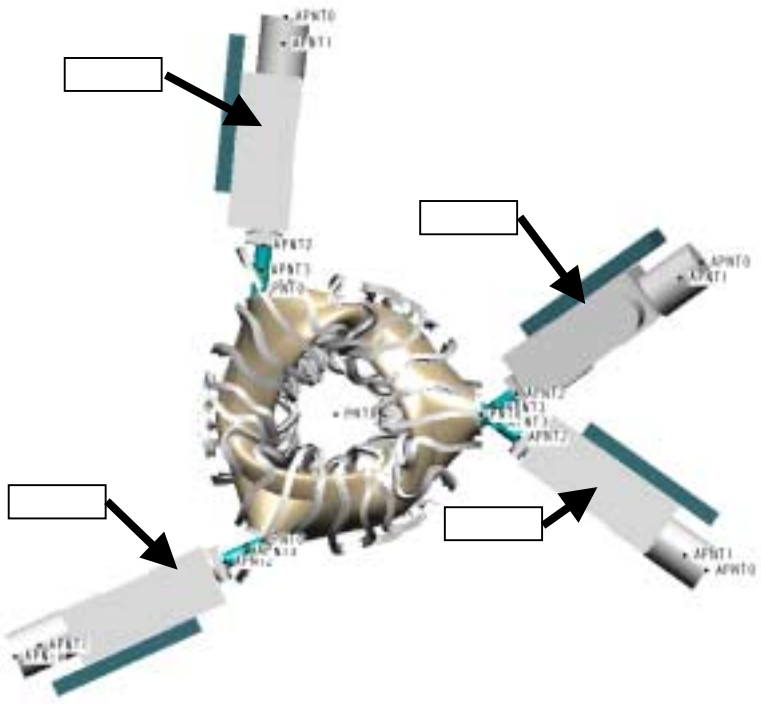
From: Wayne Reiersen

Date: 10/17/00

References: [1] H. Kugel, "The Effect of Fringe Magnetic Fields on NCSX NBIS Operation", July 26, 2000

Re: Stray fields in the vicinity of the neutral beams

Stray fields in the vicinity of the neutral beams were calculated for the most recent modular coil configuration (1009a1). This configuration has the modular coil on the v=0 symmetry plane pulled back to accommodate tangential NB injection, as shown in the figure below.



Stray field plots are provided in the figure below. The stray field at the ion source is about 40 gauss, increasing to about 80 gauss at the front of the neutralizer cell. Both of these regions have magnetic shielding provided to reduce the stray field by a factor of 50 [1]. The stray field in the region between the neutralizer and front of the beamline ranges from 80 gauss to 4000 gauss. Unlike in PBX where the stray fields were largely vertical, in this case the fields are largely oriented in the horizontal plane. For instance, at 4.5m the field is 591 gauss. This field has components of 481 gauss in the direction of the beamline, 383 gauss normal to the beamline in the horizontal plane and only 11 gauss in the vertical direction.

Henry Kugel has agreed to assess the performance, design, and cost impacts of these fields but his initial reaction was that pulling the outer leg of the symmetry coil out to ~3.5m did not appear to cause any major problems. This is indeed good news!

One caution however, is that in the flexibility studies, some of the PF currents in the modular coil case are LARGE. These may turn out to be the dominant stray fields in the critical grid and neutralizer areas.