Field Configurations in NSTX and C-Mod

M. Ulrickson

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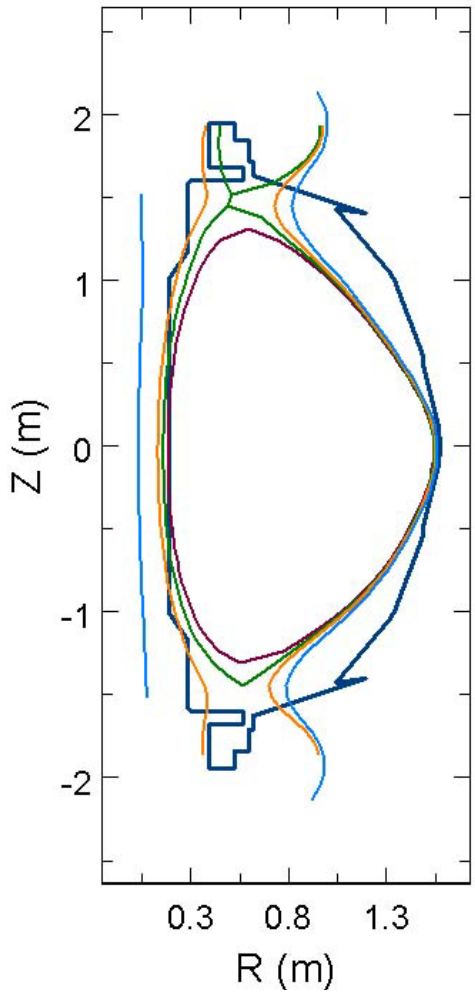
Outline

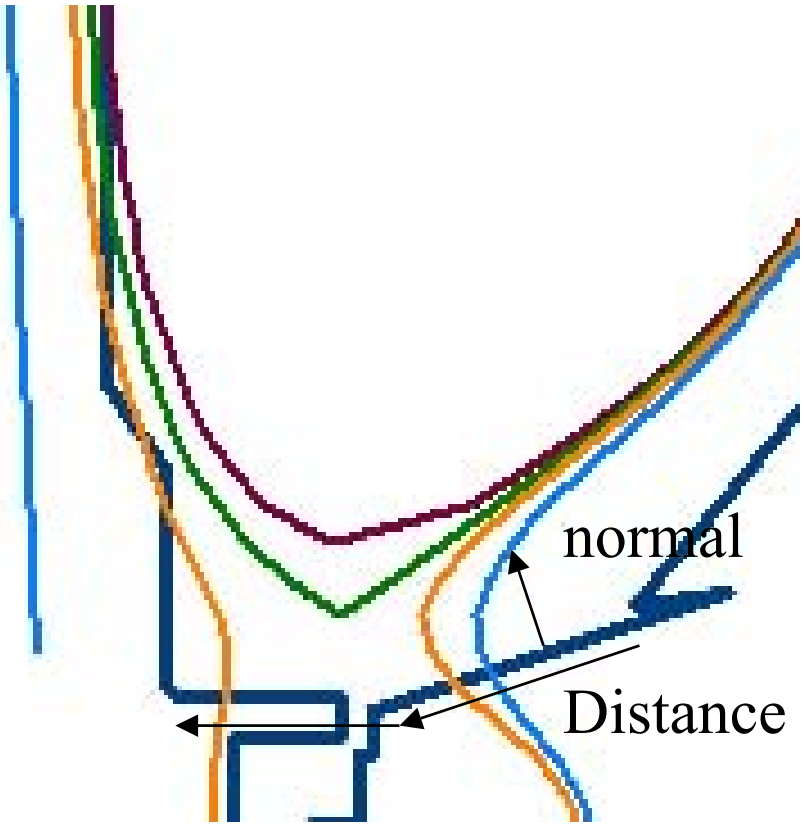
- NSTX field values along the outer divertor plate
- C-Mod field values along the outer divertor plate
- A general observation about toroidal field gradients
- Requirements for MHD experiments to support ALIST
- Discussion of MHD test experiments
- Work Plan for FY02

NSTX Vessel and Field Lines



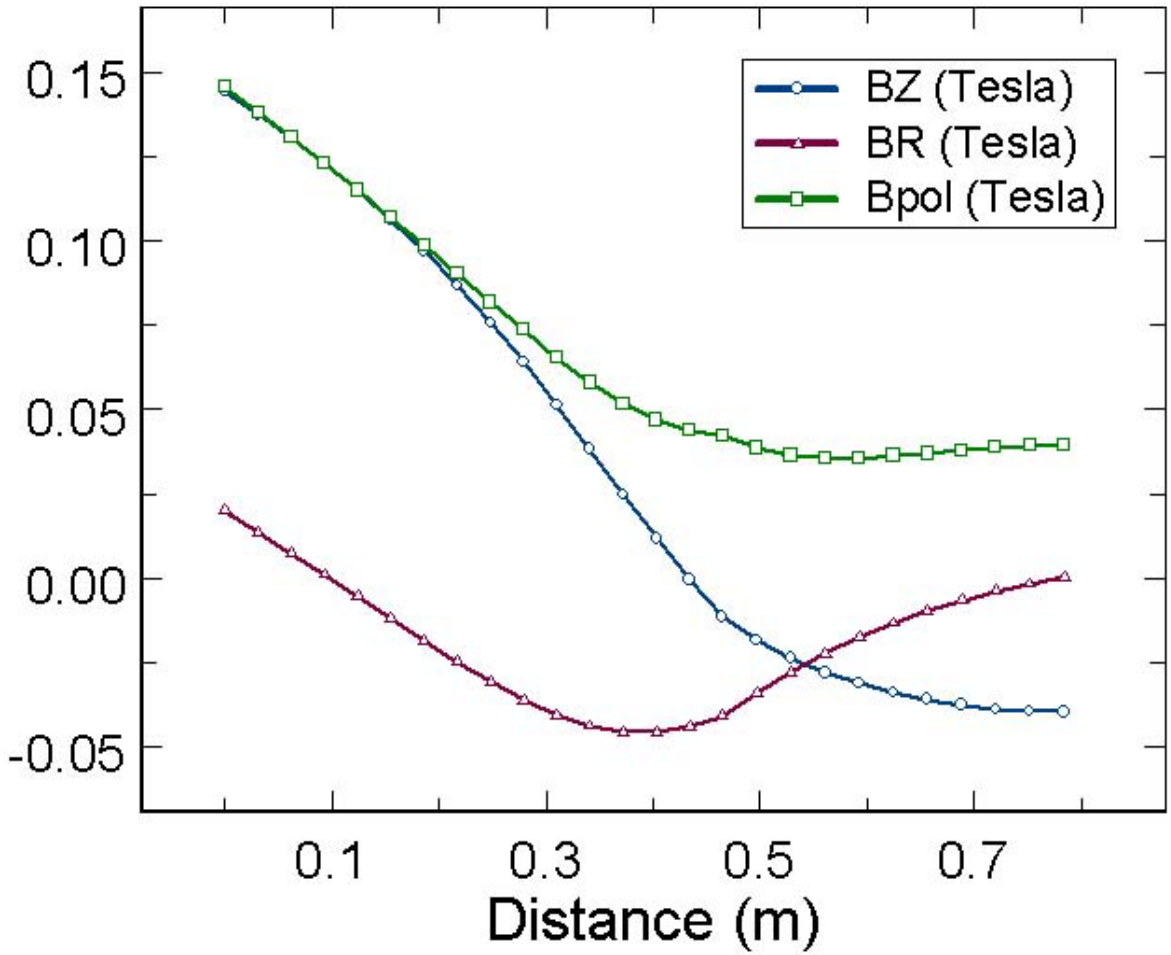
- The solid blue line is the approximate interior of the vacuum vessel
- The plasma is inside the red surface
- There is an x-point outside the last closed flux surface
- This plasma is defined by the inner wall.

NSTX Divertor Plate Detail

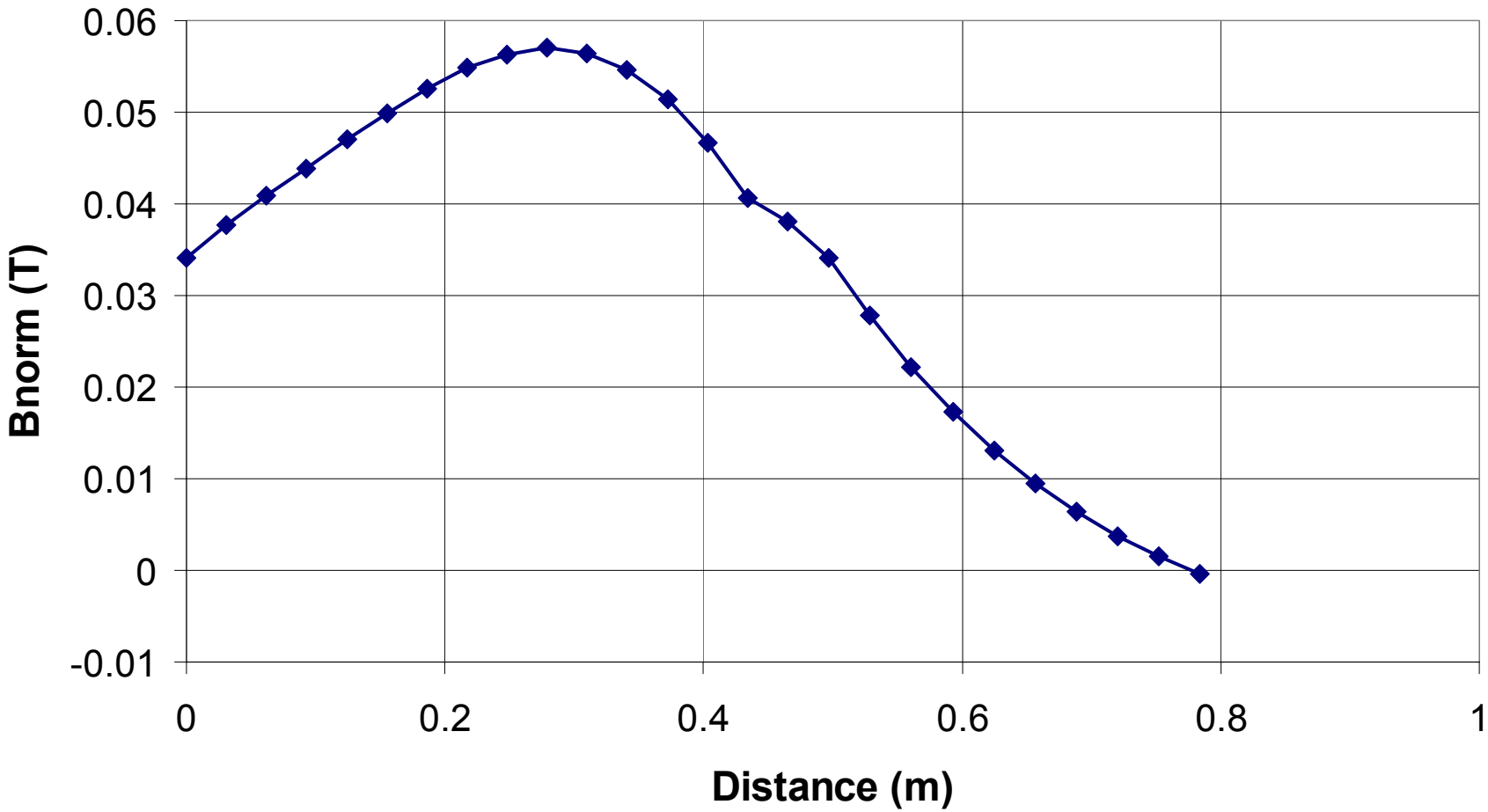


- **Distance is measured from the outside toward the inside along the divertor plate.**
- **The surface normal to the divertor plate is calculated from the shape of the plate.**

Poloidal Field at the NSTX Divertor



NSTX Divertor Field



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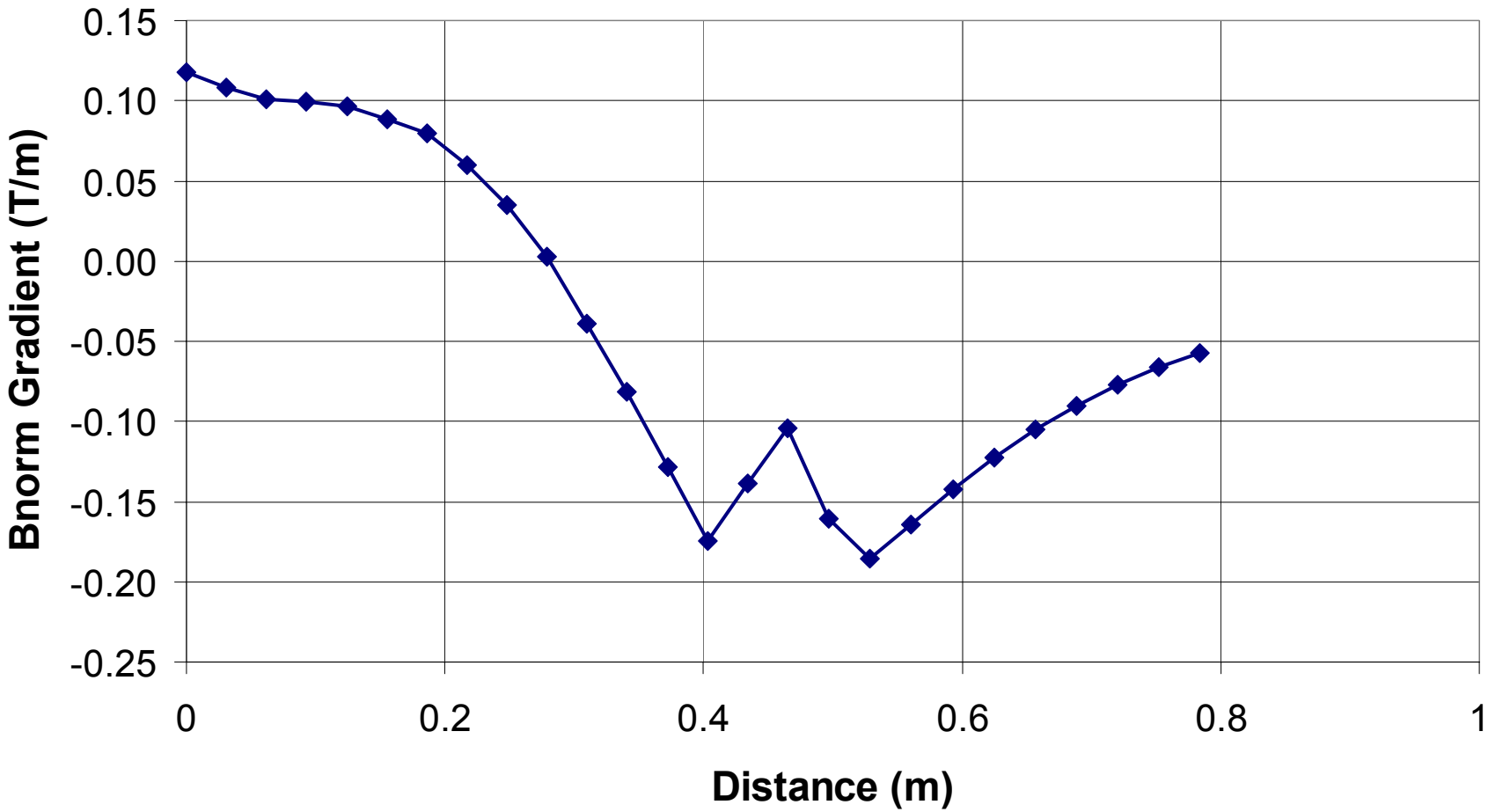
NSTX Divertor Field Gradient



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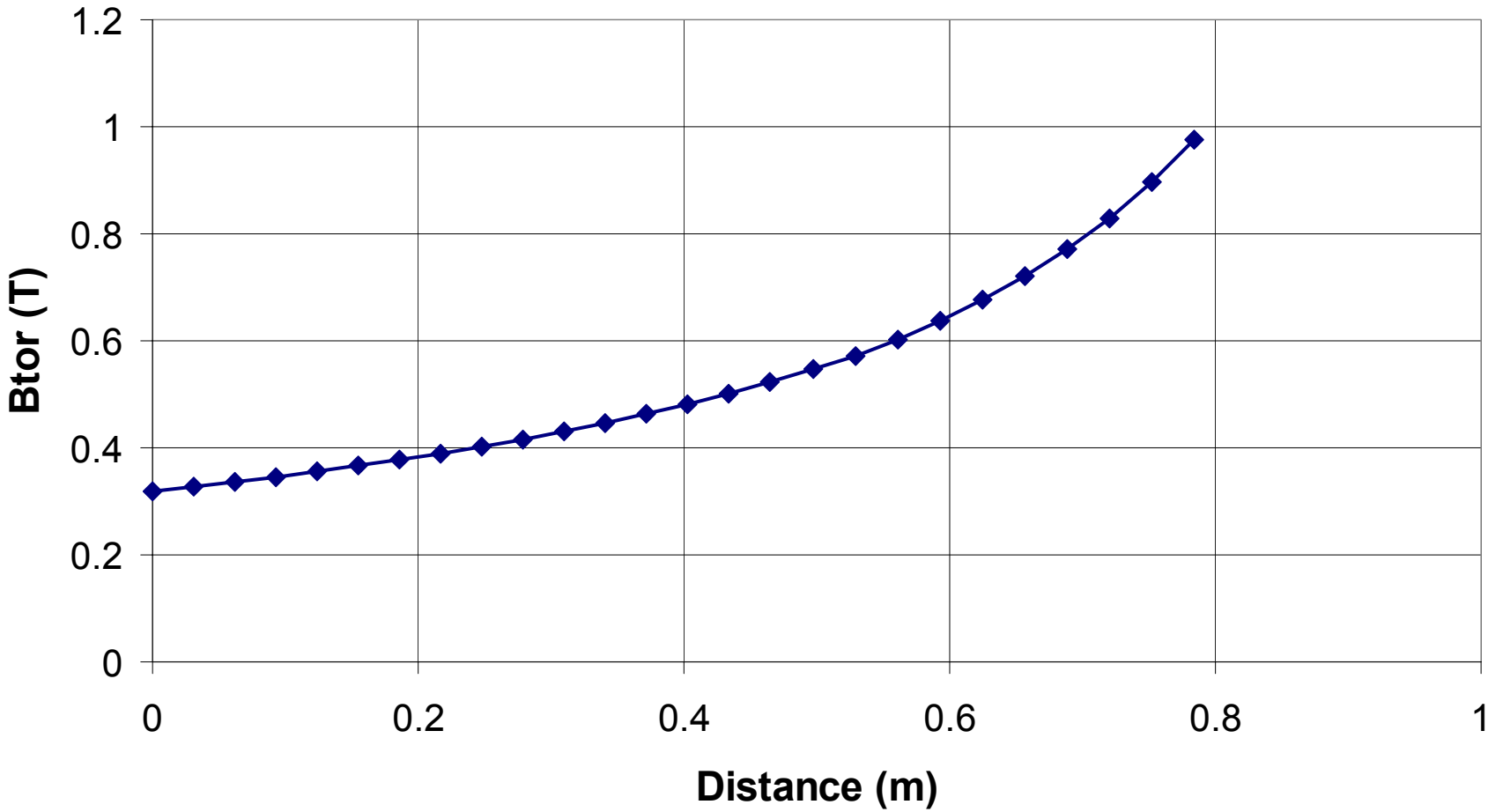
NSTX Toroidal Field at Divertor



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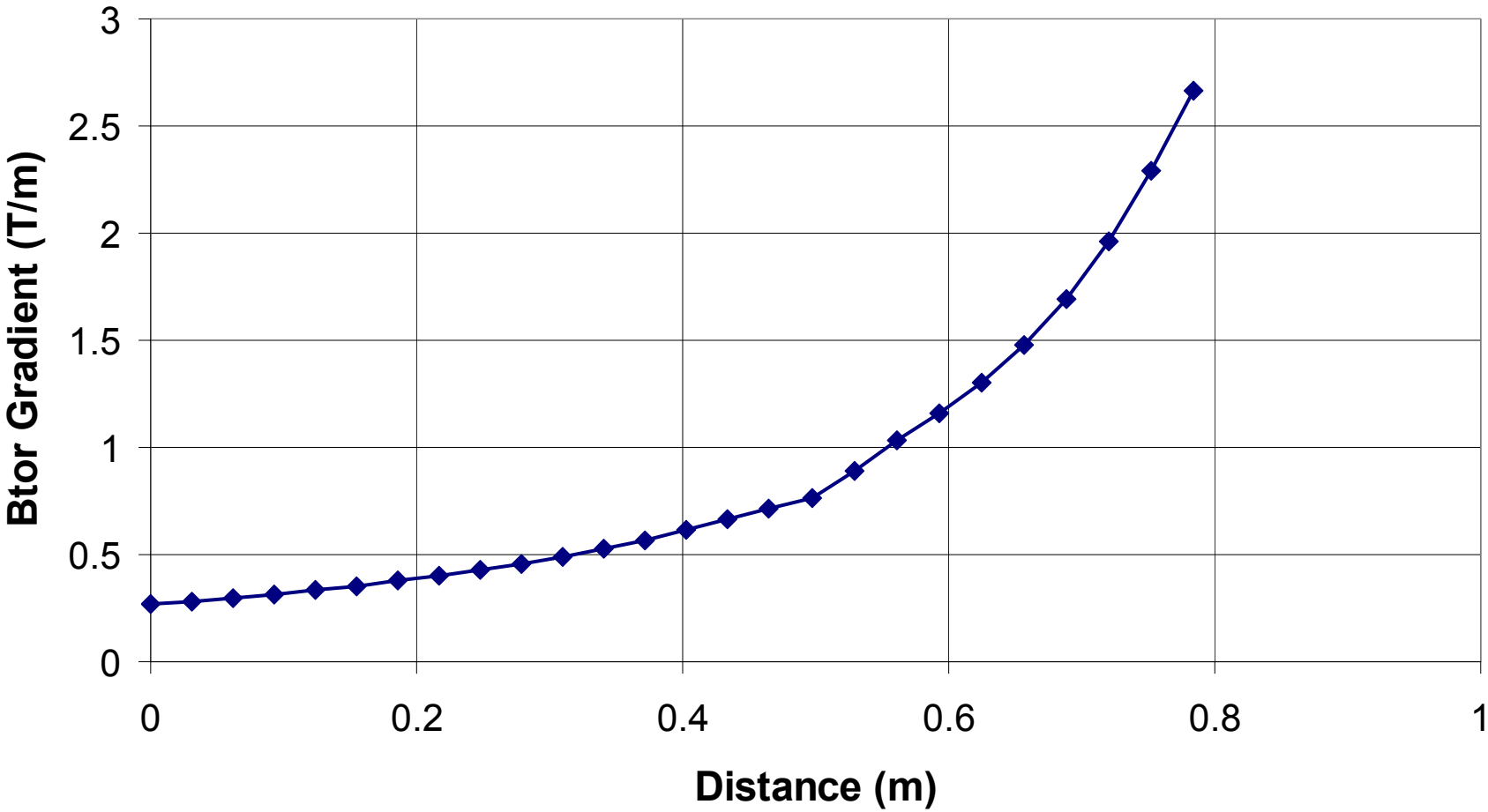
NSTX Toroidal Field Gradient (Divertor)



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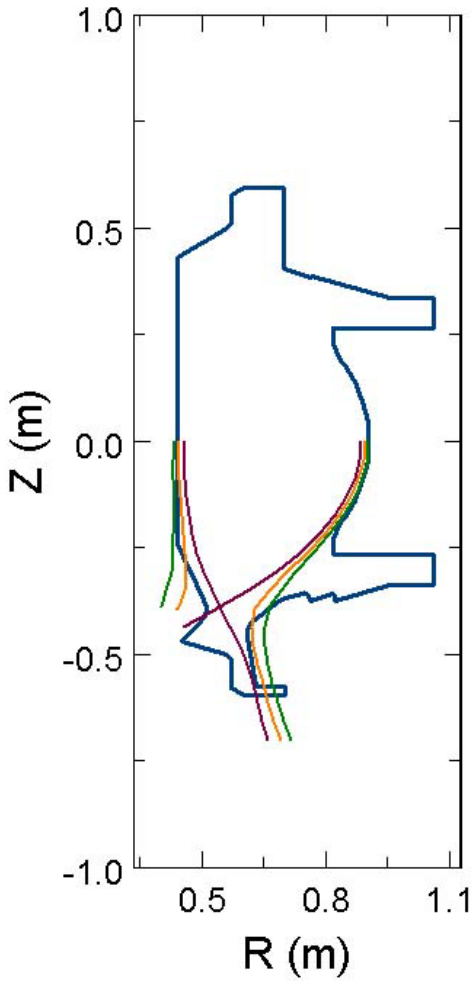
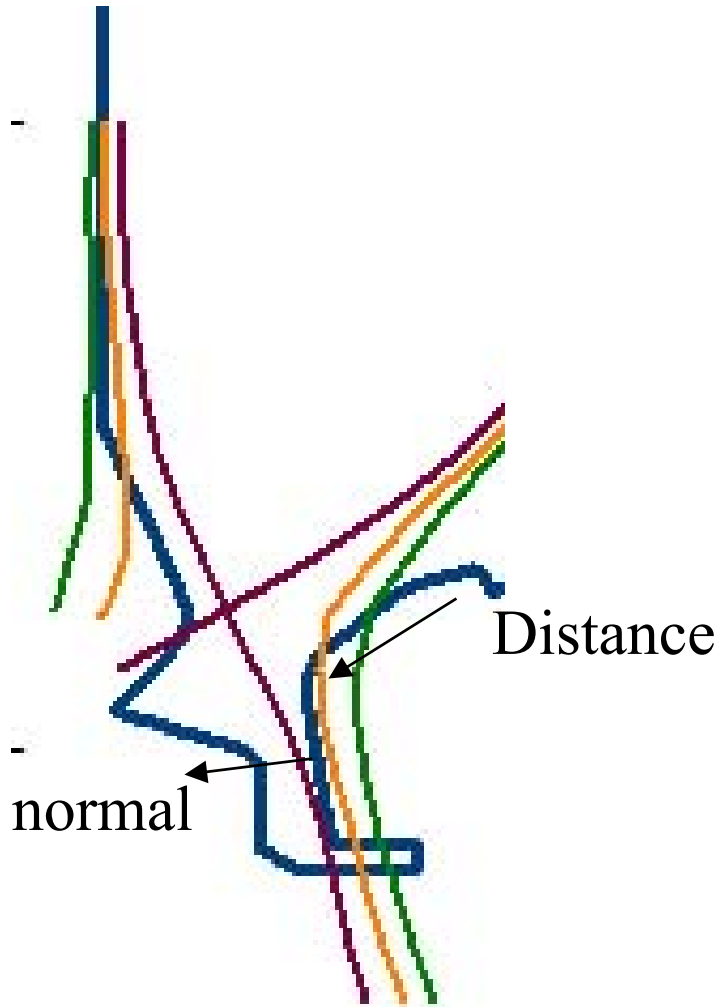
C-Mod Vessel and Plasma



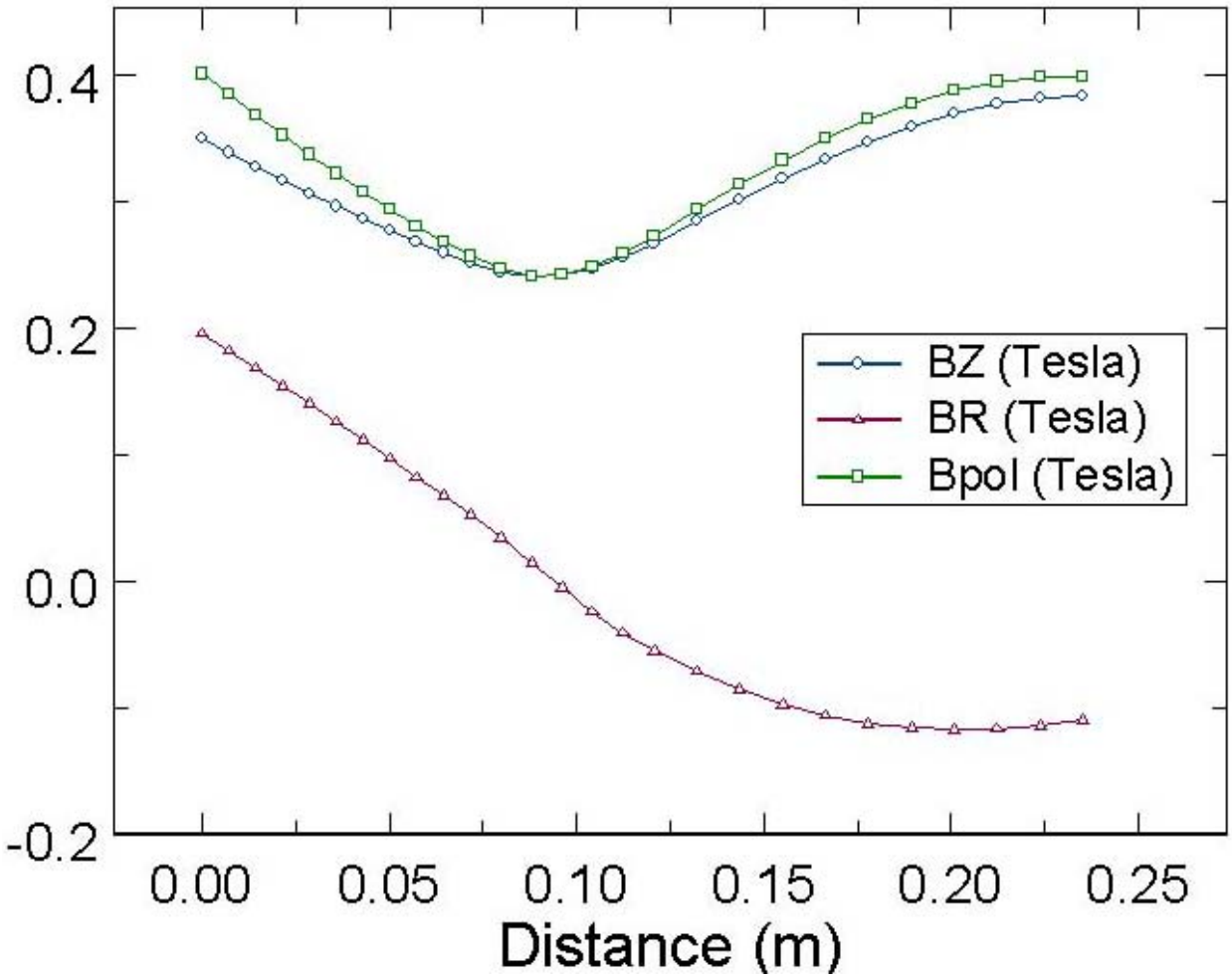
- The solid blue line is roughly the interior shape of the C-Mod vacuum vessel
- The other lines are surfaces of constant poloidal field
- The plasma in inside the innermost line
- The x-point is clearly seen

C-Mod Divertor Plate Detail

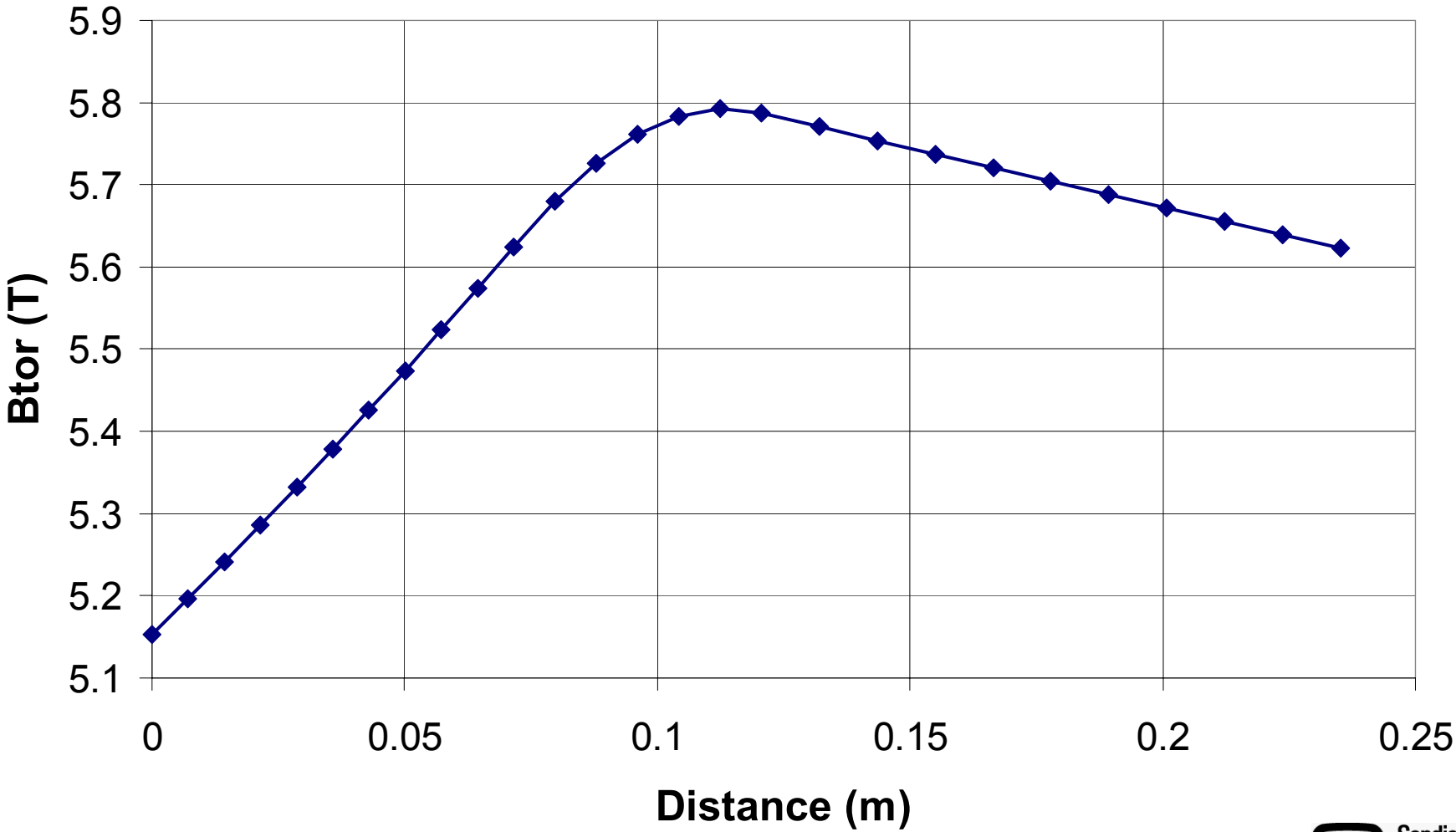


- The distance is measured from the outside toward the inside.
- Note the nearly vertical portion near the strike point (red field line).
- The surface normal has more variation than in NSTX (closed versus open divertor)

Poloidal Field at the C-Mod Divertor



C-Mod Toroidal Field at Divertor



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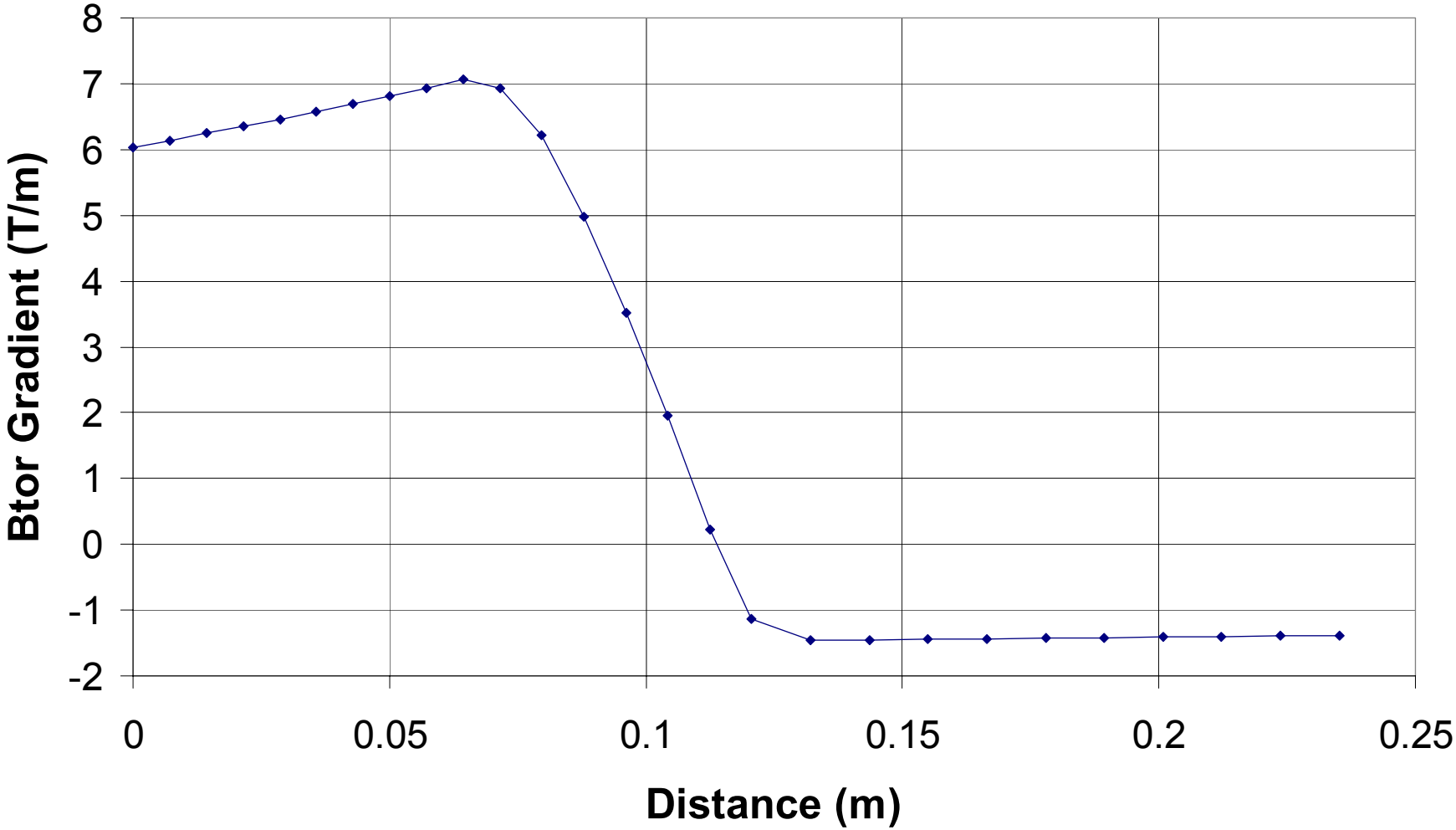
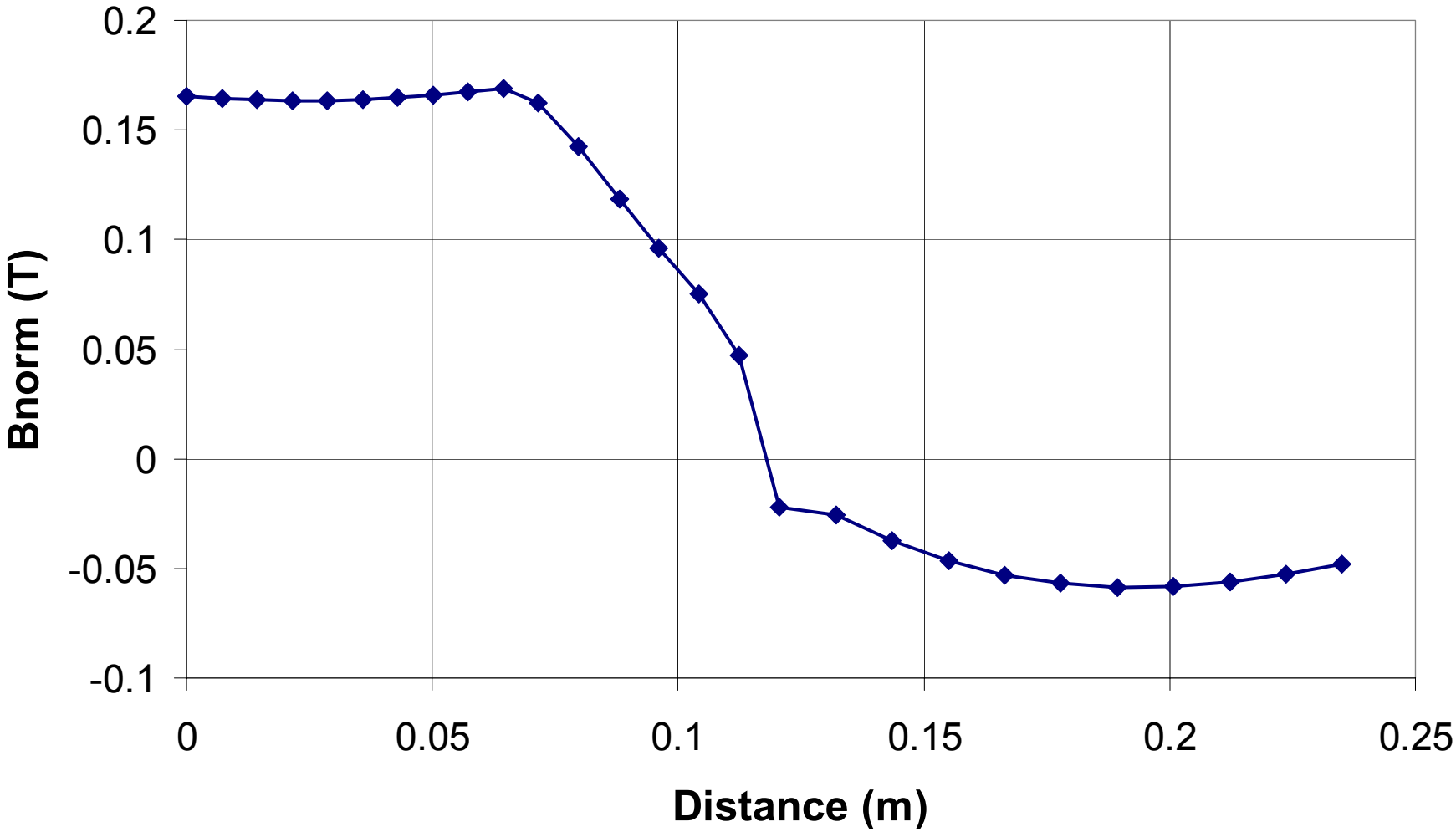
C-Mod Toroidal Field Gradient (Divertor)



C-Mod Divertor Field



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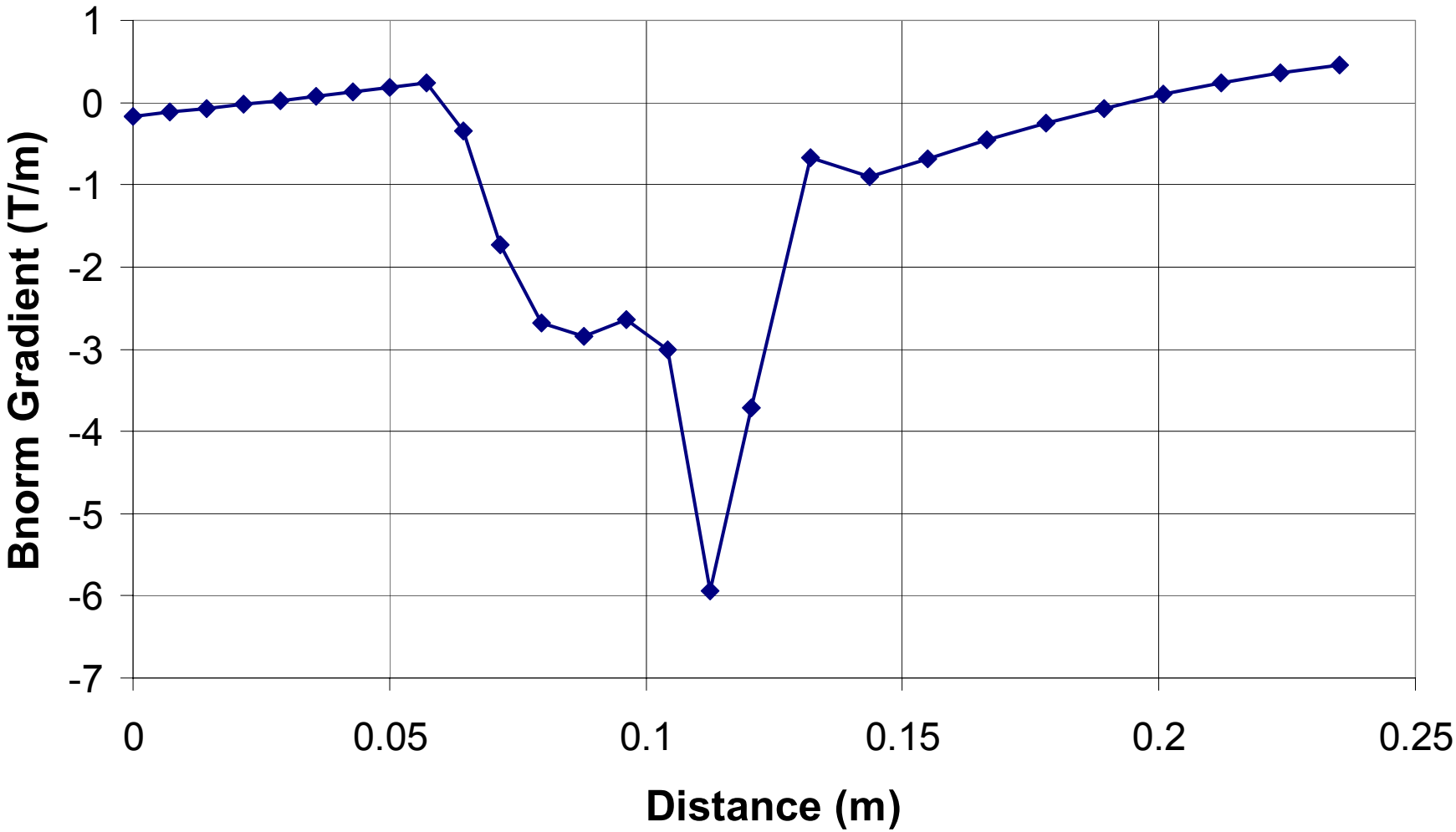
C-Mod Divertor Field Gradient



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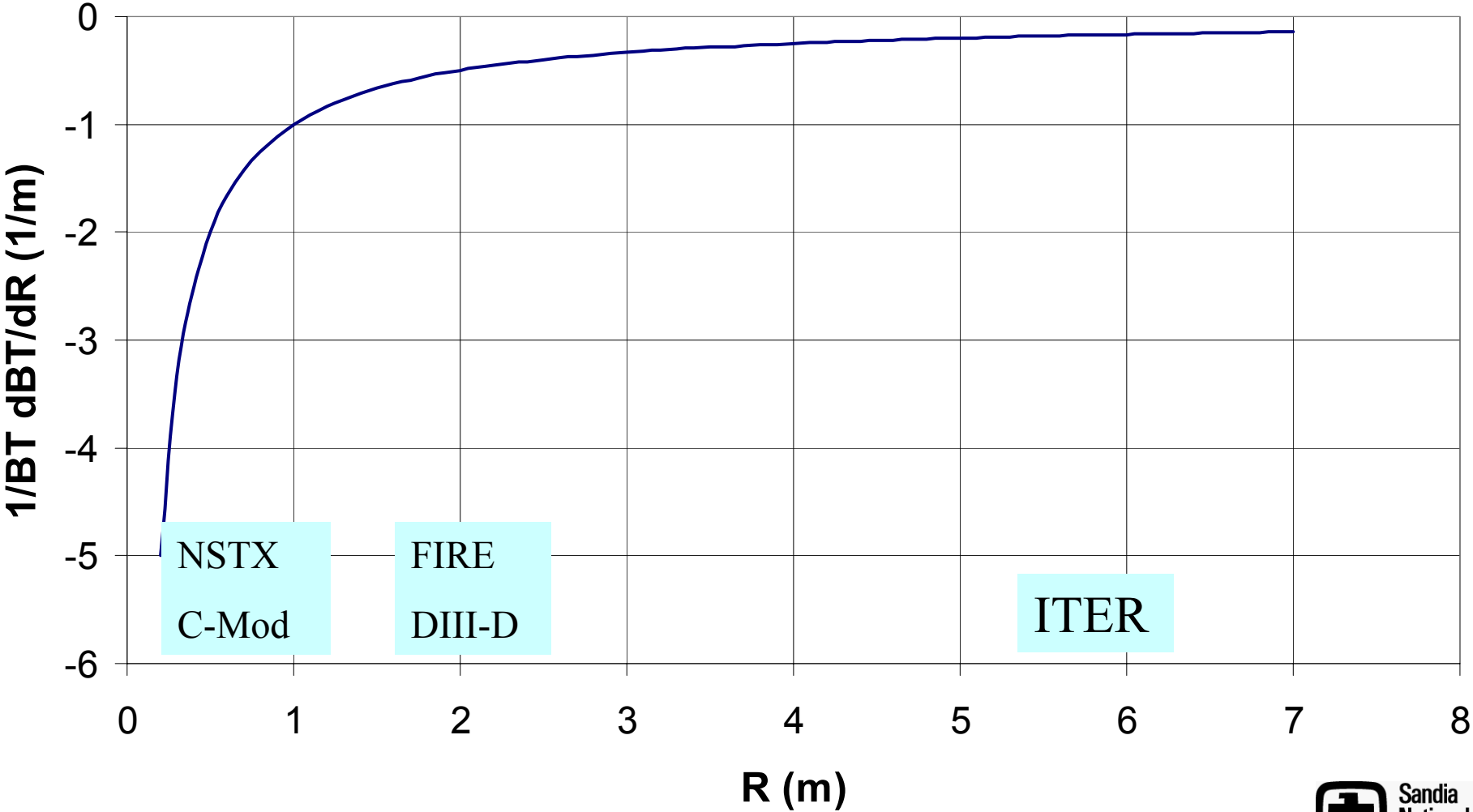
Variation of Toroidal Field



Conclusions

- Due to the small size of C-Mod and NSTX the toroidal field gradients are larger than for FIRE, DIII-D (or especially ITER).
- The variation of the field over a typical divertor plate is unique to a given machine, and the gradients are quite large (Tesla per meter).
- MHD experiments to simulate applications of liquid surfaces will have to be able to make a variety of field configurations.