Ballooning and Local Shear Properties of NSTX Plasmas*

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Abstract

The NSTX device can exhibit interesting magnetic field properties because of its small aspect ratio legacy. The magnetic field lines are very non-uniformly distributed in the poloidal cross-section, spending much less time in the outer major radius region of the plasma, not unlike the configuration obtained in a high β discharge with a substantial Shafranov shift or a bean-shaped plasma. The local magnetic shear is thus expected to exhibit strong inhomogeneity within magnetic surfaces, including the very likely existence of substantial regions of vanishing local shear even when the global shear is strong. The shear properties is reflective on many physical aspects, most obviously on the ballooning modes where the field lines interchange are facilitated in the regions of low local shear. We examine the magnetic configuration in a variety of equilibria in the NSTX device together with the effect on ballooning modes. This entails obtaining appropriate models of the equilibria, a sufficiently accurate refinement of these for stabilitiy studies and finally, a mapping for the additional quantities for the stability codes. The intercommunication between the various codes necessary for this is carried out within the SWIM framework[1].

References

[1] Don Batchelor, *This meeting.*

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