Minutes of the NCSX Physics Meeting of 10/14/99

Chuck Kessel has studied the effect of removing various Fourier coefficients from the boundary specification of c82. The issue of what Fourier modes must be retained bears on the difficulty of producing the field with coils, particularly in regard to the question of how close the coils need to be to the plasma, and is also relevant to the issue of robustness. Chuck finds that removing the m=5 Fourier coefficients produces a maximum boundary deviation of 4.3 mm, and causes the kink growth rate to increase from 1.8e-5 to 3.0e-4. (1.0e-4 is considered a maximum tolerable growth rate. At that amplitude, it is expected that full stabilization can be obtained by a small reduction of beta.) Removing instead the n=3 Fourier coefficients produces a boundary deviation of 6.2 mm, and gives a kink growth rate of 8.6e-5. Both of these modifications give negligible changes in the iota profile. Chuck also looked at removing Fourier components based on their magnitude. Removing all modes with amplitude less than 1.e-3 produces a maximum boundary deviation of only 3.8 mm. The calculated kink growth rate actually goes down, to 4e-6. The interesting configuration produced in this way is called c82-mod. Its iota profile is nearly identical to that of c82. A plot of mod(B) along a field line reveals a small increase in the level of the ripple. It was suggested that it would be interesting to use c82-mod as the starting point for further optimization, and to compare the resulting configuration with c82. Starting with c82-mod, Chuck has also removed various individual Fourier components to study their impact on the maximum deviation, on the kink growth rate, on the mod(B) ripple, and on iota. The results of these calculations were described.