

Minutes of the Stellarator Working Group Meeting of 5/13/99

Long-poe Ku described a new configuration, c93, for which the peak sheet current density is estimated to be about 25% lower than that in c82. The fast ion confinement, evaluated by Don Spong, is about the same as that in c82. The kink beta limit is about 3.7%, as compared with 3.9% for c82. The rotational transform is close to that of c82. The elongation of c93 is slightly greater (1.98 vs 1.9). The algorithm for evaluating the sheet current density in the optimizer still uses the old method for generating the coil surface, and the sheet current will have to be reevaluated on the new surface to confirm the reduction in current density.

Harry Mynick presented his results for the thermal confinement in c93. The ion energy confinement time, evaluated with GTC, is calculated to be about 18.5 ms, compared with 16.9 ms for c82.

Jim Lyon discussed key reactor issues for compact stellarators. Key parameters are the plasma aspect ratio, A_p , the ratio of the maximum field at the coils to the volume average field, B_{max} / B_0 , and the ratio of the major radius to the minimum space between the coil winding surface and the plasma, A_{delta} . Because a minimum physical distance is needed between the plasma and the coils, the value of A_{delta} implies a minimum reactor size. The fusion power scales as the fourth power of B_{max} / B_0 . Near term calculations will determine B_{max} / B_0 vs. A_{delta} for a set of QA and QO configurations of varying plasma aspect ratio.

Peter Mioduszewski discussed considerations for power and particle handling in compact stellarators. Several schemes for power and particle handling in stellarators were discussed: the local island divertor, the helical divertor, and the rail limiter. In developing an approach appropriate for NCSX, the first step will be to calculate the structure of the magnetic field outside the last closed flux surface.