Stellarator Theory Teleconference
Minutes 4/10/03
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Lang Lao (GA) discussed the status of the V3FIT project, which is developing an equilibrium reconstruction (ER) code for stellarators. The members of the V3FIT team are: S. Hirshman and E. Lazarus (ORNL), L. Lao (GA), J. Hanson and S. Knowlton (Auburn Univ.). ER codes are routinely used in the analysis of tokamak data, but no similar codes exist for stellarators. Such a code is also needed to aid in the design of magnetic diagnostics for NCSX. A two-phase approach has been adopted, with the first phase now mostly completed. The first phase developed the capability to calculate the response of magnetic diagnostics for a given set of plasma and external current sources, or for a given VMEC equilibrium. The tools developed in this first phase are being applied to the design of NCSX and CTH diagnostics. The second phase, now just started, will integrate the 3D response functions into the VMEC iteration procedure, and will explore regression algorithms for deducing the equilibrium for a given set of magnetics measurements. One issue for the future is removing the assumption of good flux surfaces.

Don Spong (ORNL) discussed recent progress on QPS. Two major recent advances have been the development of an improved coil design (discussed in detail in the March issue of Stellarator News) and the development and application of the capability to calculate viscosities in DKES. The improvement of the coil design has followed from a new approach of allowing a variable web in each winding pack. This has led to a reduction in the number of distinct winding form types from 4 to 3, and a reduction in the number of winding packs from 32 to 20. The vacuum surfaces in the new coil design have been improved by minimizing the normal component of the vacuum magnetic field on the full pressure plasma boundary shape, forcing one of the vacuum flux surfaces to roughly conform to the shape of the outer flux surface at full pressure. The DKES improvements take advantage of recent work of Sugama and Nishimura, which provides a way of incorporating momentum conservation into DKES. Calculations for QPS show that quasi-poloidal symmetry leads to a factor of 4 to 6 reduction in the poloidal viscosity relative to the equivalent tokamak configuration.