"Equilibrium Spline Interface (ESI) for magnetic confinement codes" by Leonid E. Zakharov, Roscoe B. White, Grigorii V. Pereverzev

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A compact and comprehensive interface between magneto-hydrodynamic (MHD) equilibrium codes and gyro-kinetic, particle orbit, MHD stability, and transport codes is presented. Its irreducible set of equilibrium data consists of four 2- or 3-D functions of coordinates and four 1-D radial profiles together with their first derivatives. The C reconstruction routines, accessible also from Fortran, allow the calculation of basis functions and their first derivatives at any position inside the plasma. After this all vector fields and geometric coefficients required for the above mentioned types of codes can be calculated using only algebraic operations with no further interpolation or differentiation.

The interface is designed for both two and three dimensional MHD equilibrium configurations. It is also compatible with extension to arbitrary (beyond the "ideal" equilibrium) toroidal configurations with nested or perturbed magnetic surfaces.