Outline of FOCUS’ code structure August 31, 2017

**Initialization routines**

* initial : Read input namelist.
* readsrf : Read surface. This may be the VMEC-style description of the plasma boundary, or the axis-style description. The surface position, normal etc. will all be discretized and saved in a structure.
* rdcoils Read coils. This may involve “fitting” a Fourier series to the coils.ext file, reading the FOCUS-format Fourier series, or constructing an appropriate initialization. A structure for the coil geometry and related information will be allocated.

**Tools**

* coilxyz : Mapping Fourier harmonics of selected coil to real space.
* packdof : Packing, and unpacking, of degrees-of-freedom of coils into single vector.

**Objective functions**

* bnormal : Calculate **B.n** and its first and second derivatives.
* torflux : Calculate Ψ = toroidal flux and its first and second derivatives.
* clength : Calculate L = coil length and its first and second derivatives.
* spectral : Calculate M = spectral constraints and its first and second derivatives.

**Optimization Preparation**

* setflag : Set all internal logical flags, normalize weights as required, prepare for optimization.

**Optimization Algorithms**

* descent : Steepest descent method, and all required subroutines.
* congrad : Conjugate gradient, and all required subroutines.

**Post Routines**

* archive : Save coils, etc. to restart files.

Internal variables of FOCUS

**Structures**

* surface : all surface information.
* coils : all coil information.

**Arrays**

* cosmt, sinmt : trigonometric coefficients.
* bmnweights : weight.