A Tetrahedral Mesh 3-D Ideal MHD Equilibrium Code GEORGE
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98195 — A new code has been developed to solve the zero beta equilibrium equation
mu0*J = curl(B) = Lambda*B on a tetrahedral mesh in an arbitrary 3-D geometry.
The function Lambda(x) must be constant along field lines and on flux surfaces, but
may be specified arbitrarily across surfaces, where surfaces exist. It must be spatially
constant in ergodic regions where there are no surfaces. The solution is computed by
alternately solving curl(B) = Lambda*B with Lambda specified, and then updating
Lambda = Lambda(B) and iterating until converged. The first equation is easily
solved using standard methods for computing Taylor states. The Lambda update is
most easily accomplished by tracing field lines and attempting to find the q value,
which is constant on a magnetic surface but generally does not exist for lines that
do not lie on surfaces. Lambda may then be specified as a function of q where the
q value exists, and constant where the q value does not exist. Examples will be
presented of 3-D equilibria in HIT-SI for different ratios of spheromak current to
injector current and injector current to injector flux.

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