LAPS discretization and solution of plasma equilibrium[1] MARIA
MISSANELLI, GIAN LUCA DELZANNO, ZEHUA GUO, BHUVANA SRINI-
VASAN, XIANZHU TANG, LANL — LAPS provides spectral element discretization
for solving steady state plasma profiles. Our initial focus is on its implementation
for two dimensional open magnetic field equilibria in linear and toroidal geometries.
The linear geometry is an axisymmetric magnetic mirror with anisotropic pressure.
The toroidal case is a tokamak scrape-off layer plasma. Structured grids are pro-
duced by the grid generation package in LAPS. The spectral element discretization
uses modal bases over quadrilateral elements. A Newton-Krylov solver implemented
with the Portable, Extensible Toolkits for Scientific Computing PETSc is applied to
iteratively converge the solution. Care has been taken in the code design to separate
the grid generation, spectral element discretization, and (non)linear solver from the
user-specified equilibrium equations, so the LAPS infrastructure can be easily used
for different applications.

Xianzhu Tang
LANL