A second-order Grad-Shafranov solver with accurate derivative computation IRAJ ESHGHI, NYU, LEE RICKETSON, ANTOINE CERFON, Courant Institute / NYU — We present progress on a fast Grad-Shafranov and Poisson solver that uses the finite element method with linear elements to find equilibria of the electro-magnetic potentials inside tokamaks. The code converges with second-order errors, and we introduce a module which can take derivatives of the potential at no increase in error. Thus, this code can be much faster than most higher-order finite element solvers, while still retaining a sufficiently small error margin in the physically relevant quantities.

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