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**NIMEQ: MHD Equilibrium Solver for NIMROD**<sup>1</sup> E.C. HOWELL, C.R. SOVINEC, University of Wisconsin-Madison — Development of a Grad-Shafranov solver within the framework of the NIMROD code (nimrodteam.org) is described. The solver will facilitate two-fluid studies of spheromak plasmas including the effects of realistic simply connected geometries. The solver utilizes the existing high order polynomial finite element basis employed by NIMROD, which avoids numerical noise that is created when interpolating other equilibria data onto a NIMROD grid. A direct solve is performed for the quantity  $\Psi/r^2$ . The Grad-Shafranov operator is converted to a total divergence, allowing the use of conventional boundary and regularity conditions. A Picard scheme is used to advance the nonlinear iteration. The solver is benchmarked on analytical cylindrical profiles, and convergence studies on stability results test accuracy. Results on equilibria in SSPX geometry with parameterized profiles are also described.

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Prefer Oral Session  
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