

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

One size fits all: analytic MHD equilibrium for tokamaks, spherical torii, FRCs and spheromaks ANTOINE CERFON, JEFFREY FREIDBERG, MIT PSFC — We present a new family of analytical solutions of the Grad-Shafranov equation with Solov'ev type profiles. These solutions, which are extensions of the ones previously proposed in [1] and [2], can be used to describe equilibria in any toroidally axisymmetric device. As compared to [1] and [2], our addition of a new polynomial term to the flux function gives an additional degree of freedom to satisfy the boundary conditions. The advantages are two folds: 1) Our solutions can describe FRC and spheromak equilibria, and 2) For tokamaks and spherical torii, we obtain equilibria at the equilibrium beta limit, characterized by the appearance of a poloidal field null on the inboard side of the plasma, for a wide range of aspect ratios, elongations, and triangularities. Using these new solutions, we will investigate several scalings with the different parameters of interest.

- [1] R. H. Weening, Phys. Plasmas 7, 3654 (2000)
- [2] B. Shi, Phys. Plasmas 12, 122504 (2005)

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Date submitted: 20 Jul 2009

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