Analytic solutions of the Grad-Shafranov equation using Solov'ev profiles for different configurations and aspect ratios J. JULIO E. HERRERA-VELZQUEZ, ICN-National Autonomous University of Mexico, KASSANDRA SALGUERO-MARTNEZ, National Autonomous University of Mexico, OMAR MACEDA-RAMREZ, ICN-National Autonomous University of Mexico — The purpose of this paper is to test the approach followed in Refs 1 and 2 to provide analytic solutions for the Grad-Shafranov equation for different configurations, and clarify some of the details not mentioned in them. While the toroidal current profile is necessarily limited, and cannot be realistic, some of the main features of the magnetic fields can be obtained. Going beyond the calculation of averaged poloidal β and safety factor q^*, we examine the magnetic fields, the effect of the choice of the Solov'ev profiles on the Shafranov shift, and the safety factor for four tokamak configurations: ST-40, SPARK and ITER, as well as a small tokamak attempted design, where inverse triangularity could be studied. We expect this study to be provide useful reference solutions for numerical codes.
[1] S.B. Zheng, A.J.Wootton and E. Solano, *Physics of Plasmas* **3** (1996) 1176.
[2] A.J. Cerfon y J.P. Freidberg, *Physics of Plasmas* **17** (2010) 032502.

Julio Herrera
ICN-National Autonomous University of Mexico

Date submitted: 01 Jul 2019   Electronic form version 1.4