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Development of a free-boundary version of the SIESTA MHD equilibrium code H. PERAZA-RODRIGUEZ, R. SANCHEZ, J.M. REYNOLDS-BARREDO, V. TRIBALDOS, Universidad Carlos III de Madrid, J. GEIGER, Max-Planck-Institut fr Plasmaphysik, Greifswald, Germany, S.P. HIRSHMAN, M.R. CIANCIOSA, ORNL — SIESTA is a recently developed MHD stability code that allows for the self-consistent calculation of nonlinear MHD equilibrium solutions for 3D magnetic configurations without the assumption of nested magnetic surfaces. The original version of the code [S.P. Hirshman, R. Sanchez and C.R. Cook, Phys. Plasmas 18, 062504 (2011)] was written as a fixed boundary code that imposed that the normal component of the magnetic field vanished at the prescribed plasma edge. In this contribution, we describe a procedure to extend SIESTA to perform free-boundary equilibrium calculations, thus increasing the range of problems to which the code can be applied. The process requires an automated way to extend the computational domain and mesh all the way to the vacuum vessel and the construction of a reasonable initial guess for the magnetic field, from which SIESTA can iterate towards equilibrium. Examples will be provided for several configurations of the W7-X stellarator.

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