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Solving free-plasma-boundary problems with the SIESTA MHD code R. SANCHEZ, H. PERAZA-RODRIGUEZ, J.M REYNOLDS-BARREDO, V. TRIBALDOS, Univ Carlos III De Madrid, SPAIN, J. GEIGER, Max-Planck Institut fur Plasmaphysik, Greifswald, GERMANY, S.P. HIRSHMAN, M. CIANCIOSA, Oak Ridge National Laboratory, Tennessee, USA — SIESTA [1] is a recently developed MHD equilibrium code designed to perform fast and accurate calculations of ideal MHD equilibria for 3D magnetic configurations. It is an iterative code that uses the solution obtained by the VMEC code [2] to provide a background coordinate system and an initial guess of the solution. The final solution that SIESTA finds can exhibit magnetic islands and stochastic regions. In its original implementation, SIESTA addressed only fixed-boundary problems. This fixed boundary condition somewhat restricts its possible applications. In this contribution we describe a recent extension of SIESTA [3] that enables it to address free-plasma-boundary situations, opening up the possibility of investigating problems with SIESTA in which the plasma boundary is perturbed either externally or internally. As an illustration, the extended version of SIESTA is applied to a configuration of the W7-X stellarator. [1] S.P. Hirshman, R. Sanchez and C.R. Cook, Phys. Plasmas 18 (2011) 062504 [2] S.P. Hirshman and JC Whitson, Phys. Fluids 26 (1983) 3553; S.P. Hirshman and W.I. Van Rij, Comput. Phys. Comm. 43 (1986) 143 [3] H. Peraza-Rodriguez, J.M. Reynolds-Barredo, R. Sanchez, V. Tribaldos, J. Geiger, S.P. Hirshman and M. Cianciosa. Phys. Plasmas 24, 082516 (2017)

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