

Abstract Submitted
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Bootstrap current and the magnetic structure of W7-X¹ A.S. WARE, P.S. BURNS, University of Montana, S.P. HIRSHMAN, Oak Ridge National Laboratory — The impact of self-consistent bootstrap current on the magnetic structure of equilibria in computational studies of the W7-X stellarator is examined. While one of the criteria in designing W7-X was the minimization of the bootstrap current, at finite- β there will likely still be some residual bootstrap current. Even a small bootstrap current can change the rotational transform profile and thus, change the magnetic configuration, especially in the edge region. In this work, free-boundary equilibria for the W7-X coil configuration have been obtained at a range of β values and the bootstrap current has been calculated for each. Equilibria with self-consistent bootstrap current (i.e., where the plasma current is solely from the bootstrap current) have been obtained as well. The impact of both finite- β and bootstrap currents on the magnetic structure in the edge is examined using the SIESTA code [Hirshman, *et al.*, Phys. Plasmas **18**, 062504 (2011)]. The formation of islands in the edge regions is indicated as a result of self-consistent bootstrap current. Methods of removing this impact of bootstrap current will be discussed.

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