

Abstract Submitted  
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**Verification of bootstrap current models<sup>1</sup>** ALEXEI PANKIN, SCOTT KRUGER, Tech-X Corp., EMILY BELLI, General Atomics, JAMES CALLEN, U. Wisconsin, ARNOLD KRITZ, TARIQ RAFIQ, Lehigh U., FACETS TEAM, CPES TEAM — The FACETS, PTRANSP, and XGC0 codes are used to verify neoclassical models for the bootstrap current and neoclassical resistivity. The most widely used reduced models for the bootstrap current such as Hazeltine-Hinton, NCLASS, NEO, and Sauter models agree reasonably well in a range of plasma parameters that most modern conventional tokamaks operate. However, the models start to disagree when they are applied to high-beta and low aspect ratio plasmas such as NSTX and MAST. There are also concerns about applicability of asymptotic limits used in some analytical formulations of bootstrap current models in the H-mode pedestal regions where the plasma gradient scale lengths are comparable or smaller than the finite-orbit (banana) widths. In order to discriminate between different reduced models and to refine their ranges of applicability, the models are benchmarked against more first-principle computations available through the XGC0 and NEO codes. The direct verification of the models are facilitated by recent developments in the FACETS framework that support simultaneous access to a selection of neoclassical models including NCLASS, Sauter, Hazeltine- Hinton, and NEO. Model verification results will be presented. A special consideration will be given to the plasma parameter regimes where the models diverge.

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