Test of Bootstrap Current Models Using High β_P EAST-Demonstration Plasmas on DIII-D

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Abstract. Magnetic measurements together with kinetic profile and motional Stark effect (MSE) measurements are used in full kinetic equilibrium reconstructions to test the Sauter and NEO bootstrap current models in DIII-D high β_P EAST-demonstration experiment, which aims at developing on DIII-D a high bootstrap current scenario to be extended on EAST for a demonstration of true steady-state at high performance and uses EAST-similar operational conditions: plasma shape, plasma current, toroidal magnetic field, total heating power and current ramp-up rate. It is found that the large edge bootstrap current in these high-β_P plasmas allows the use of magnetic measurements to clearly distinguish the two bootstrap current models. In these high collisionality and high β_P plasmas, the Sauter model over-predicts the peak of the edge current density by about 30%, while the first-principle kinetic NEO model is in close agreement with the edge current density of the reconstructed equilibrium. These results are consistent with recent work showing that the Sauter model largely overestimates the edge bootstrap current at high collisionality [Belli EA *et al* 2014 Plasma Phys. Control. Fusion **56** 045006].

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