Comparison of the numerical modeling and experimental measurements of DIII-D separatrix displacements during H-modes with Resonant Magnetic Perturbations

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Abstract. Numerical modeling of the plasma boundary position and its displacement due to external magnetic perturbations in DIII-D low-collisionality H-mode discharges is presented. The results of the vacuum model are compared to the experimental measurements for boundary displacements including Thomson scattering electron temperature T_e, charge exchange recombination spectroscopy, beam emission spectroscopy, soft x-ray, and divertor Langmuir probe measurements. Magnetically perturbed discharges with toroidal mode number n=2 and n=3 are studied. It is shown that the vacuum model predictions agree well with the measurements above and below the midplane, and disagree at the outer midplane in discharges where significant kink amplification is present. The role of the plasma response is studied using the two-fluid MHD code M3D-C[1], and the results are compared to the vacuum model showing that the plasma response model underestimates the boundary displacements.

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