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Measurements of the 3D boundary distortion due to external n=2 magnetic perturbations in comparison to ideal MHD MATTHIAS WILLENSDORFER, WOLFGANG SUTTROP, ERIKA STRUMBERGER, HARTMUT ZOHM, FRANCOIS ORAIN, Max-Planck-Institute for plasma physics, garching, ANDREW KIRK, DAVID RYAN, CCFE, Culham Science Centre, Abingdon, Oxon, OX14 3DB, UK, ASDEX UPGRADE TEAM TEAM — Best ELM mitigation/suppression at DIII-D and AUG are achieved by external magnetic perturbation (MP) fields, when the applied poloidal mode spectrum is aligned with the mode (kink) at the edge that is most strongly amplified by the plasma. This kink mode causes a 3D displacement of the plasma boundary, which is characterized at AUG using data from toroidally localized high resolution diagnostics and rigid rotating MP-fields with different applied poloidal mode spectra. Various profile and imaging diagnostics, e.g. electron cyclotron emission (ECE), are used to determine the amplitude, the penetration and the poloidal mode structure of the displacement around the outer midplane. The displacement around the X-point/plasma top, which is related to ELM mitigation, is measured using a new steerable ECE and SOFT X-ray. These measurements are compared to MHD codes like JOREK, MARS-F and VMEC. As predicted by MHD, the measured amplitudes clearly exceed the vacuum field calculations. The displacement measured by imaging ECE indicates a resonant response, although the calculated magnetic structure of this edge kink peaks at poloidal mode numbers larger than the resonant components.

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