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P4.1099 Vacuum estimation of error field correction on ASDEX Upgrade

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A study of the vacuum magnetic field produced by the Poloidal Field (PF) coil system of ASDEX Upgrade is presented. In the model both coils and their powersupply feedthroughs are considered. The latter contribute to the error fields (EFs) that have already been observed and reported in [1, 2]. The effect on the B field due to PF coils, assumed to be perfectly axisymmetric, is addressed by analytical formulas, while a 1-D model is applied to feedthroughs [3]. The model is applied to a reference shot (#35352) for the computation of the normal component of B (i.e. B_n) projected on the q = 2 rational surface. The resulting EF pattern is located near the feedthroughs region, with a maximum value close to 0.25 mT. ASDEX Upgrade is equipped with a set of 16 invessel saddle coils [4], that can be used to minimize the effect of EFs on plasma discharges. A preliminary correction strategy of the non-axisymmetric field generated by feedthroughs is based on a Virtual Shell Approach, that is made up by 8 upper and 8 lower saddle loops built on the q = 2 surface. The matrix M_16×16 of the mutual inductances between active coils and virtual shell is computed numerically, such that I = M−1φ , where φ is the vector of the fluxes linked by the virtual shell loops and I stores the unknown currents needed for compensating those fluxes. A more detailed analysis is foreseen to include further possible sources of Efs (e.g. passive conductive structures, ferromagnetic tiles, tilting of PF coils). Moreover, MARS-F [5] can be used for calculations of plasma response to a prescribed m, n harmonic of the EF distribution, and a new correction strategy may be applied for reducing the resulting EF pattern.
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