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Tomographic reconstruction of the azimuthal current distribution in a HiPIMS discharge[1] KEVIN KOEHN, DENNIS KRUEGER, RALF PETER BRINKMANN, Ruhr-University Bochum — High power impulse magnetron sputtering (HiPIMS) is a novel physical vapor deposition technique capable of depositing thin films with superior properties. A characteristic feature of this magnetron based discharge is a torus of plasma embedded inside the external poloidal magnetic field. This azimuthal current distribution is primarily driven by a combination of guiding center drifts and a contribution which stems from a pressure gradient. The current distribution can in principle be obtained from measurements of the induced radial and axial magnetic field. A first approach is based on the solution of Ampere's law, however, it is limited to the area where magnetic field measurements are available. Particularly, the region in close vicinity to the target where most of the azimuthal current is expected, is excluded. In this work, we investigate alternative approaches to determine the current density. The plasma torus is modeled by N ring currents scanning the whole domain. The total magnetic field generated by the superposition of all current contributions is fitted to the experimental data. Different regression methods like linear regression, ridge regression and an approach based on Bayes' theorem are implemented and compared against each other.

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