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(G*) Multivariate Regression Approach in the Prediction of Side Wind Velocity Using Spherical Segmented Langmuir Probe Measurements

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This work considers the use of spherical segmented Langmuir probes as a means to measure ionospheric plasma flow velocities. This is done by carrying out three-dimensional kinetic self-consistent Particle in Cell (PIC) simulations to compute the response of a probe to space plasma under a range of space environment conditions of relevance to satellites in low Earth orbit (LEO) at low and mid latitudes. Computed currents and corresponding plasma parameters, including densities, temperatures, and flow velocities are then used to construct a solution library which is used to construct regression-based inference techniques. Model inference skills can then be assessed directly from the synthetic data sets obtained from our solution library. The method is then applied to actual segmented Langmuir probes mounted on the Proba-2 satellite.

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