Abstract Submitted
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Evaluation of Advanced Algorithms to improve EEDF extraction from Langmuir Probe data Using Tikhonov Regularization Methods A. EL SAGHIR, C. KENNEDY, S. SHANNON, NCSU, B. PATHAK, J. ALEXANDER, K. NORDHEDEN, University of Kansas — EEDF extraction from Langmuir probe data is ill-posed due to the integral relationship between the EEDF and probe current. Curve fitting of data and reconstruction of the integral problem using regularization address this to some extent, with regularized solutions offering an advantage in EEDF accuracy over curve fitting. However, both methodologies have limitations in their ability to extract accurate EEDF's over a wide energy range for moderate signal noise. The limitations confronting regularization can be summarized in over and under regularization. Over regularization captures the high energy portion of the distribution at the expense of the low energy; and vice versa with under regularization. Advanced reconstruction algorithms using weighting and iteration are studied in order to overcome such limitations. Weighting factors scale the regularized conditioning with respect to energy to decouple the regions of interest. Iterative techniques modify the regularizer and conditioning matrix to converge on an optimal solution. To illustrate this point, the reconstruction of EEDF's from probe data taken in an electronegative RF discharge is studied. The non-Maxwellian EEDF generated by this system shows many of the challenges in EEDF reconstruction for low temperature plasmas.

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