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Automated I-V trace tting: Automated electron temperature tting of Langmuir probe I-V traces in multi- Maxwellian eedf plasmas[1]
CHENYAO JIN, CHI-SHUNG YIP, Institute of Plasma Physics Chinese Academy of Sciences: Hefei, Anhui, CN, NOAH HERSHKOWITZ, Dept. of Engineering-Physics, University of Wisconsin-Madison, GREG SEVERN, Dept. of Physics & Biophysics, University of San Diego — An algorithm for automated fitting of the effective electron temperature of a planar Langmuir probe I-V trace taken in a plasma with multiple Maxwellian electron populations is developed through MATLAB coding. The code automatically finds a fitting range suitable for analyzing the temperatures of each of the electron populations. The algorithm is used to analyze I-V traces from both the Diagnostic Test Source device in ASIPP, CAS and a similar multi-dipole chamber previously at UW-Madison which is now at USD. I-V traces reconstructed from the parameters fitted by the algorithm not only agreed with the measured I-V traces but also revealed physical properties consistent with those found in previous studies. Application of the algorithm to cylindrical probe I-V traces is also investigated. The major difficulties of such applications, i.e. distortion of the I-V traces by a low signal-to-noise ratio combined with greater sheath expansion, have been identified. It is recommended to use planar probes when signal-to-noise ratio is poor.

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