

Manual for RF compensation software

In the following we present a MATLAB computer code that performs RF compensation on raw computer acquired RF plasma Langmuir probe data.. The software is freely available from the program library. The software is user friendly and its use does not require proficiency in matlab programming apart from some basics. It can be used on matlab 6.5 version or higher. The software is called by entering the statement

RF_compensation (V,I,Area,Mi,N)

in matlab work space. The input arguments are the probe bias voltage (V), and probe current (I) data arrays as acquired by the data acquisition device. The input argument *Area* is the probe active area in units of Meter². *Mi* is the ionic mass number in amu. The input argument N defines the number of RF harmonics the used requires to remove. It can assume the values of N=1, 2, or 3 for the filtration of first, second and third harmonics respectively. Most experimental data contain all three harmonics. It is thus advised to set N=3 to eliminate all harmonics unless the software gives an error message “One or more output arguments not assigned to maxima...” In such a case the value of N may need to be reduced. The V and I data array should be loaded to matlab work space prior to running the program. Another plot containing the correct I-V is also produced. Once the data are filtered, and the RF compensated I-V characteristics is obtained, the program calls another Langmuir probe analysis program called *Analyze_Langmuir*. This program fits the filtered data to the equation

$$I = \exp[a_1 \tanh\{(V + a_2)/a_3\}] + a_4$$

Ref: A. A. Azooz REVIEW OF SCIENTIFIC INSTRUMENTS 79, 103501 (2008)

The software prompts the user asking if the fit is acceptable. This should be confirmed by pressing enter. The program proceeds to calculate all the plasma parameters and the EEDF and compare it with Maxwell –Boltzman and Druyvesteyn distribution. Figures similar the following are obtained. For further information regarding the filtered data analysis procedure used please see the manual for “Analyze_Langmuir”

