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An improved model to analyze Langmuir probe assisted photodetachment signal for measuring electronegative plasma parameters¹ NISHANT SIRSE, NCPST and School of Physical Sciences, Dublin City Univ, NOUREDDINE OUDINI, Laboratoire des plasmas de dcharges, Centre de Dvelopement des Technologies Avances, Algiers, Algeria, ABDERREZEG BENDIB, Laboratoire dElectronique Quantique, Facult de Physique, USTHB, Algiers, Algeria, ALBERT R ELLINGBOE, NCPST and School of Physical Sciences, Dublin City Univ, Ireland — A diagnostic technique for measuring negative ion parameters based on Langmuir probe assisted laser photo-detachment relies on a theoretical model which relates the rise in the electron saturation current to electronegativity in the plasma. The existing model depend on various assumptions and neglect electrostatic potential barrier formed between the laser column (electropositive column) and the surrounding electronegative plasma in order to prevent the outward flow of electrons from the electropositive plasma column. These assumptions leads to erroneous estimation of the plasma electronegativity. In the present work, we present an analytical model to analyze Langmuir probe assisted photo-detachment signal in order to improve the accuracy of measured electronegativity and extended this technique for measuring electron temperature and charged species density. The analytical model is validated using both experiments and particle-in-cell simulation. The results shows improved accuracy in the measured parameters when compared to existing model.

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