

Abstract Submitted
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Qualitative and Computational Analysis of Chaotic Behaviour in a Plasma System¹ AHMED HALA, KACST — Qualitative analysis techniques compliment computational ones in studying basic plasma systems. A Langmuir probe, immersed in a thermionically produced plasma source, measures plasma parameters yielding the so-called plasma characteristics I-V trace. By direct inspection, this trace resembles the logistic model curve developed before by Verhulst to account for population growth in relation to its sustaining resources. When a time-sweep of the Langmuir probe bias voltage is applied to the probe tip, plasma charge current is collected between the two probe bias voltage polarities. The charge content of the plasma and its sustaining energy, as sensed by the probe bias voltage time-sweep, can be measured. Moreover, and at the probe current saturation region, the total charge collected by the probe can be measured using the law of mass action. This is done without imposing any additional assumptions as to whether the charges are discrete (carried by electrons) or continuous (as in the space charge effect). Both the transitive mixed states of charges, as exhibited in the Langmuir probe trace, and the computational model, used in this paper, reveal the plasma system chaotic behaviour.

¹This presentation is in honor of Professor Noah Hershkowitz, my Ph.D. advisor

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