Laboratory Report

Estimation of discharge plasma parameters using Langmuir probe and Optical Emission Spectroscopy (OES)

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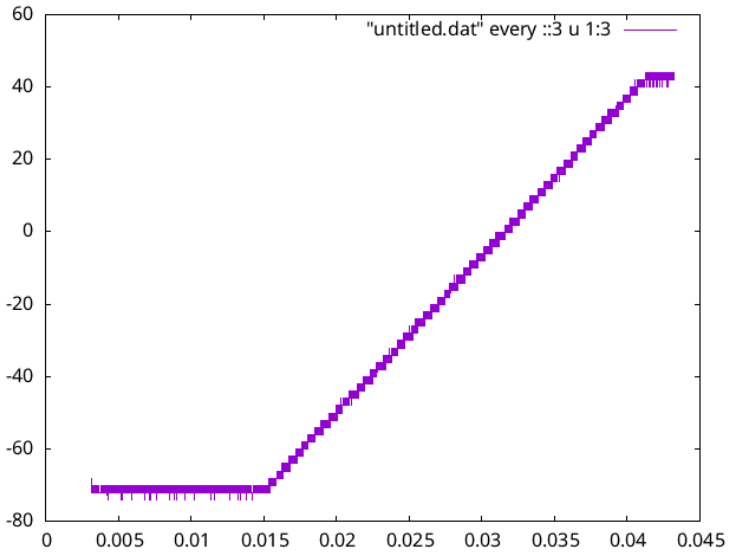
Objectives:

1. To study the IR characteristics of plasma with Langmuir probe.
2. To study the dependence of obtained IR graph by varying pressure, voltage bias and resistance.

Theory:

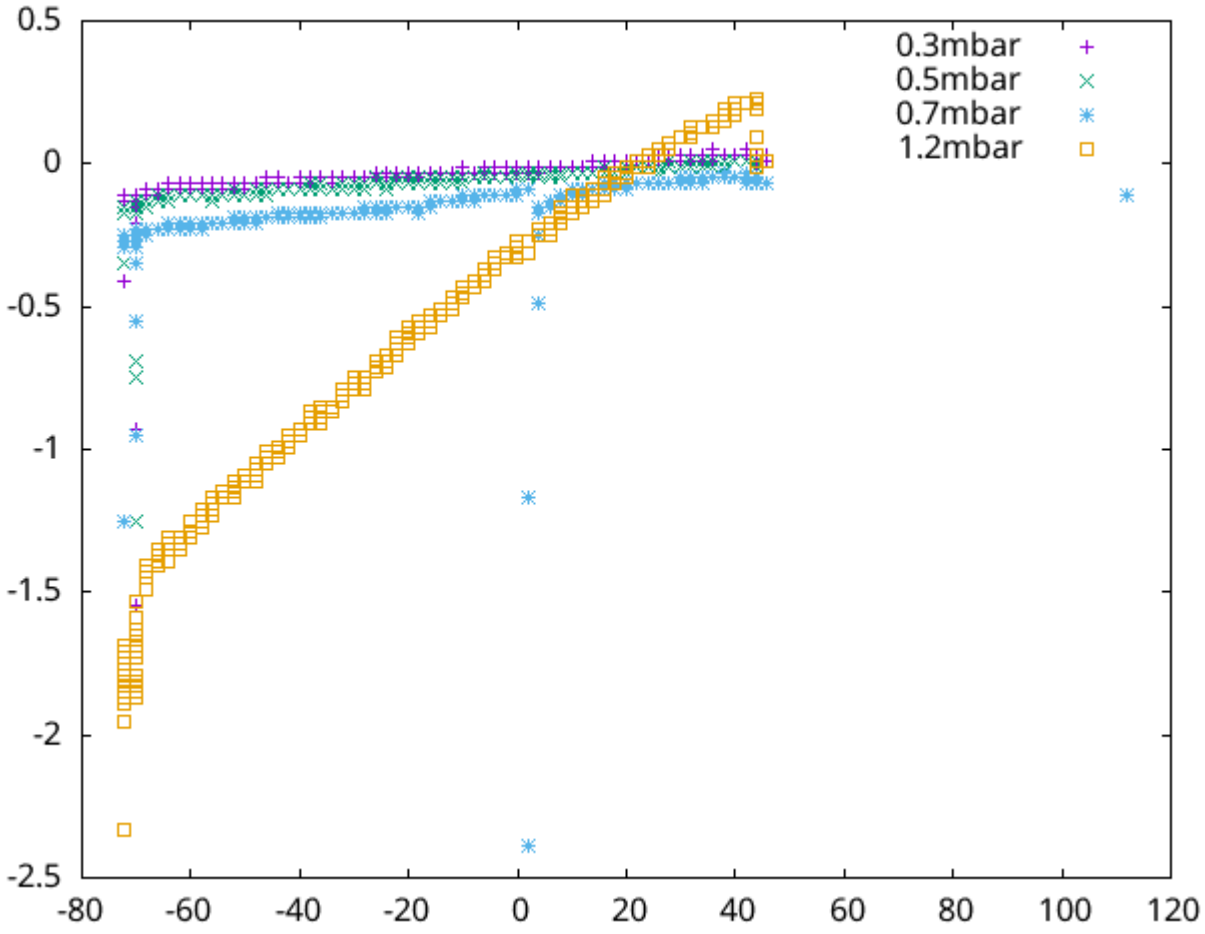
Observations:

We shall use a step voltage, so that we can study the IR characteristics in one shot.



The step voltage take, the time is on x-axis and the voltage is on Y axis.

Variation of Pressure



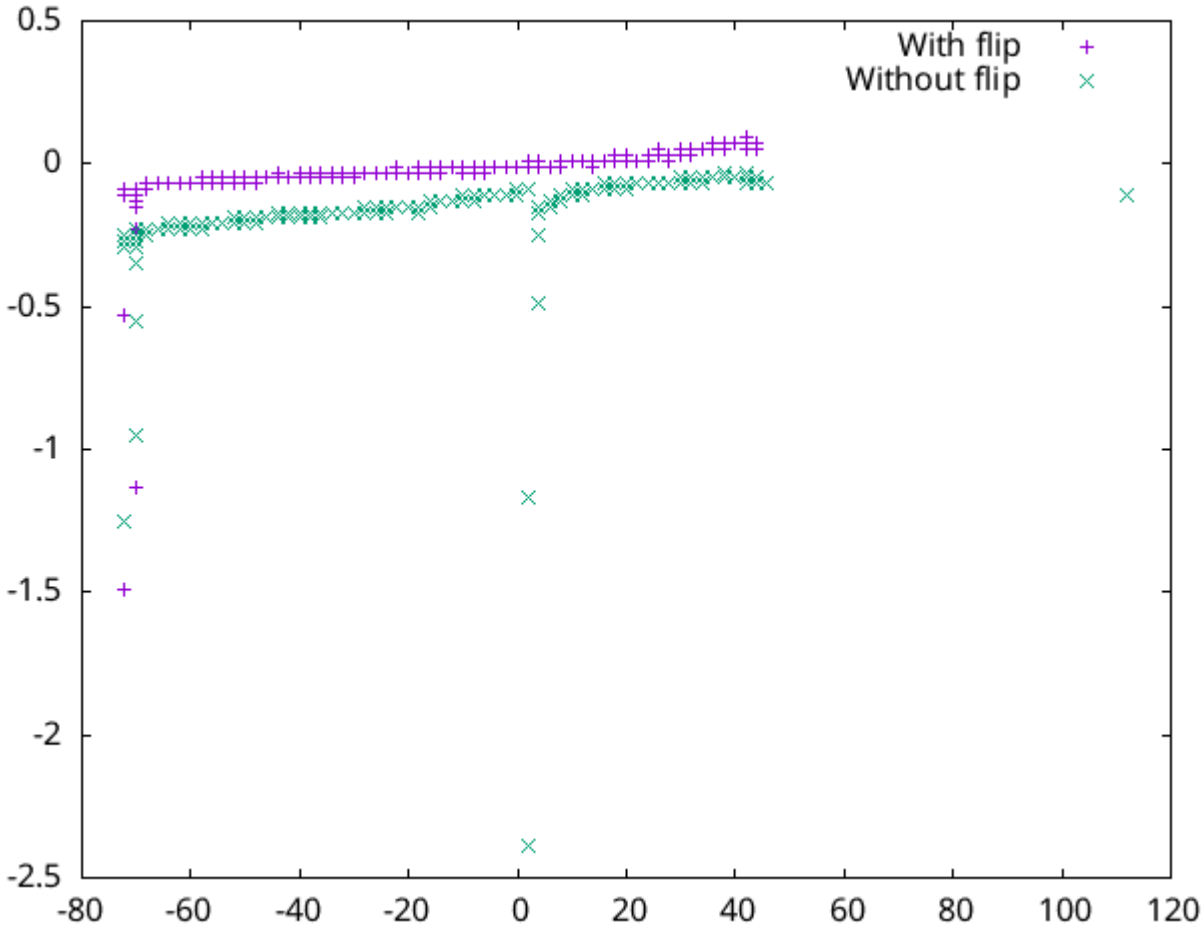
V-I characteristics of the Plasma as we vary pressure.

We can see a non-linear variation of the graph as we increase the pressure. It first decreases and then increases. The reason might be due to the Paschen effect.

$$V = \frac{Bpd}{ln\left(\frac{Apd}{ln(1+\gamma^{-1})}\right)}$$

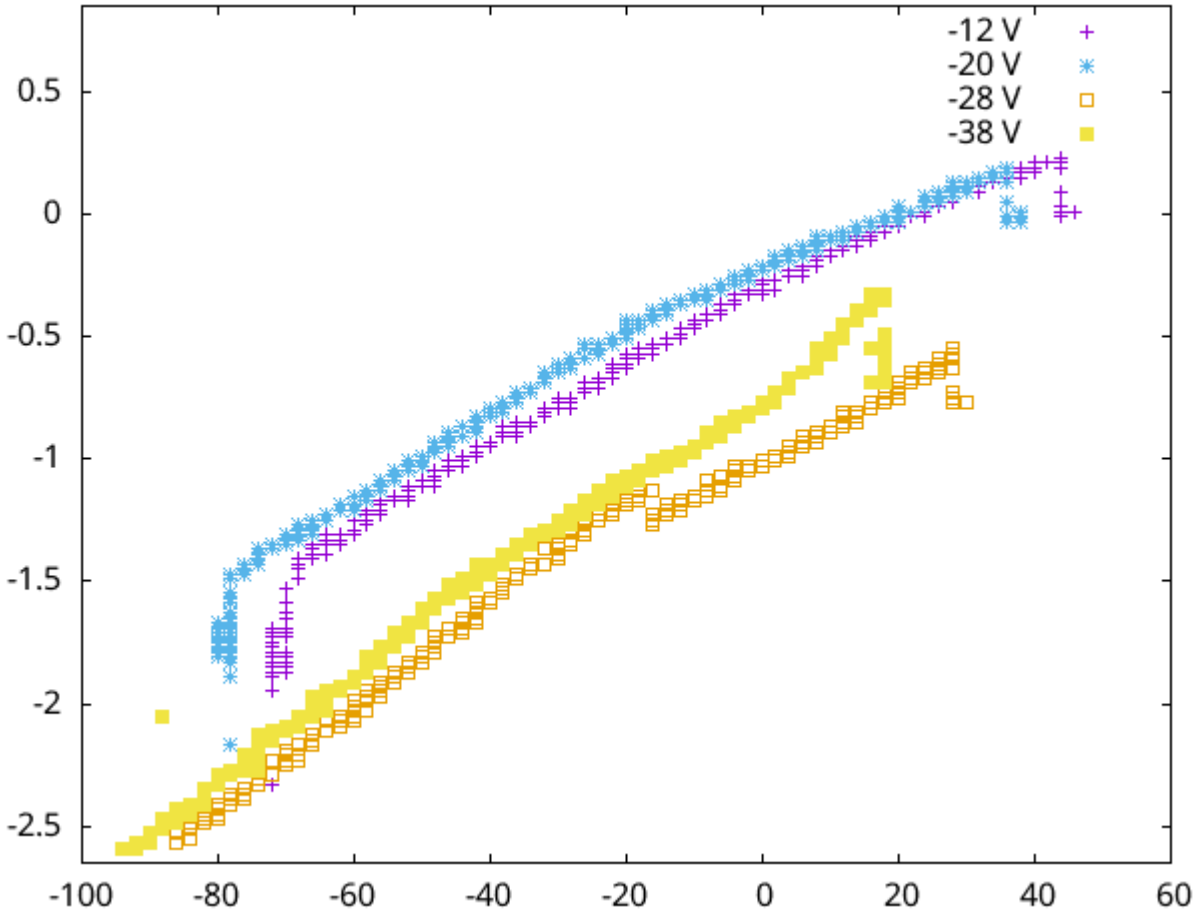
At constant V, as we vary pressure, at first, it decreases and then it increases logarithmically.

Flipping the circuit



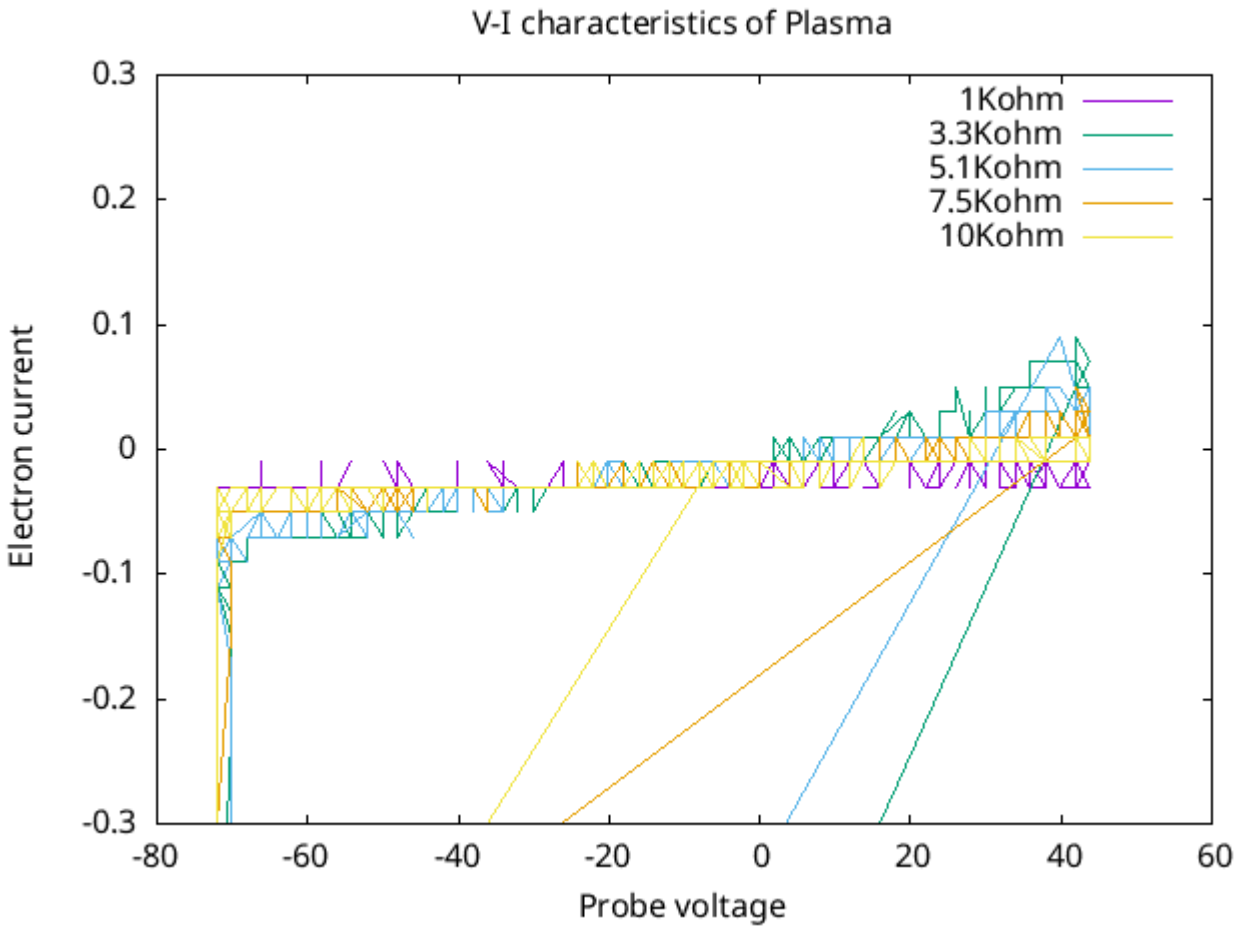
V-I characteristics of the plasma as we flip the circuit.

Variation of Bias Voltage



V-I characteristics of the plasma as we vary the bias voltage.

Variation of Resistance



V-I characteristics of the plasma as we vary resistance.

Results: