Abstract Submitted
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Langmuir probes in the intense rf environment inside a helicon discharge FRANCIS F. CHEN, UCLA — High-density helicon discharges are usually studied downstream from the antenna region. Langmuir probes are hard to use there because of the intense rf environment and heavy bombardment by ions and electrons. The plasma studied here is a small helicon discharge with permanent magnets to provide the dc B-field. A very thin probe was designed for the small discharge (5 cm diam $\times$ 5 cm long) without disturbing it. A floating rf-compensation electrode (CE) supplemented the self-resonant chokes to filter out the rf pickup of 30-50V peak-to-peak. The effect of CE size is shown. Saturation ion current varies with the square root of probe potential V_p well beyond to expected validity range of the Langmuir Orbital Motion Limited formula. Fitting the $I^2 - V$ curve with a straight line, we subtract the fitted ion current from total current to obtain the $\ln(I_e) - V_p$ curve. This is almost always straight, indicating Maxwellian electrons. With high B-fields and collisions, the transition region of the $I - V$ characteristic is very short, and sometimes absent. However, T_e can be obtained correctly in the ion-subtraction region. This is fortunate, since drawing saturation electron current can drive the probe to emission. Interesting effects of electron emission will be shown.

Francis F. Chen
UCLA

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