

T H E U N I V E R S I T Y O F M I C H I G A N
COLLEGE OF ENGINEERING
Department of Electrical Engineering
Space Physics Research Laboratory

Second Semi-Annual Report

THEORETICAL INVESTIGATION OF PLASMA WAVES
AND SPACE VEHICLE PLASMA SHEATHS

Prepared by:

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RESEARCH ACTIVITIES DURING THE REPORTING PERIOD

This is the second semi-annual status report under grant No. NsG-525, and it covers the period from 1 October 1964 to 31 March 1965.

The photoelectron energy distribution has been re-calculated using improved photon flux data and improved cross sections. This distribution has been used to calculate the contribution of the electron impact excitation to the $6300\text{\AA}$ red line emission in the atmosphere. Both of these results will be reported.

The theory of the plasma wave probe has been extended, and a paper on this subject has been presented to the Spring Meeting of the American Physical Society in Washington, D. C., April 26-29, 1965. At the present time calculations are being carried out to include the effect of Landau damping. After that numerical calculations will be performed to obtain the AC current amplitude as a function of frequency for different values of the probe potential.

The theoretical investigation of a plasma instability due to the photoelectrons and the effect of such an instability on the heating of the ambient electron gas is continuing.

In the sheath problem our effort is being directed toward incorporating the magnetic field in the calculation of the densities of the charged particles about a cylindrical probe. Only the special case of a uniform magnetic field parallel to the cylinder axis is being considered. Using the method

of Mott-Smith and Langmuir we have been able to obtain the analytic expressions (in the integral form) for the density. As a next step it is planned to carry out numerical calculations of the density for different models of the sheath potential.

PERSONNEL PARTICIPATING DURING THE REPORTING PERIOD

Ernest G. Fontheim
Clark Givens
Walter Hoegy
Madhoo Kanal
Andrew F. Nagy

FUNDS REMAINING

As of March 31, 1965, approximately \$24,800 remain of the currently allotted funds.

MONTHLY COST BREAKDOWN

MONTH	WAGES		OVERHEAD	MATERIALS & SUPPLIES	TRAVEL
	STUDENT	NON-STUDENT			
Oct.	\$ 0	\$ 991	\$ 56	\$ 61	\$ 0
Nov.	0	0	+210	24	0
Dec.	849	2664	0	5	0
Jan.	909	1377	0	51	0
Feb.	310	2290	0	42	0
March	464	1530	2530	22	0
Totals	\$2532	\$8852	\$2376	\$205	\$ 0

Grand Total \$15,831
 - 1,866
 \$13,965

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