Preface to the Third Group of "Waves in Plasma" Papers

This issue of *Radio Science* contains another group of papers on the subject of waves in plasma media. These are arranged in a reasonably logical order as the first thirteen papers of this issue.

The first paper, authored by Booker and Dyce, is a comprehensive treatment of the dispersion characteristics of waves in the magnetosphere of the earth. A novel hydromagnetic approximation is made which essentially equates the electron mass to zero rather than assuming the traditionally infinite mass for the ions. The important consequence is that the quasi-longitudinal and quasi-transverse concepts may be used over the entire frequency spectrum. The analytical results are then applied to calculate radiation patterns of a pulse source which nicely illustrate the transition from an omnidirectional hydromagnetic wave to a highly directional whistler type.

The question of whistler waves guided along the magnetic field lines in a magnetoplasma is considered in the paper by Adachi. The novel feature of the analysis is that the electron density is stratified in a direction parallel to the field lines. This model is expected to have some similarity with the situation in the earth's exosphere. The related question of waves guided along a conductor embedded in a magnetoplasma is considered in the following paper by Mushiake. His results give some insight into the behavior of antennas immersed in the ionosphere.

Propagation of electromagnetic waves in stratified ionized media is considered in the papers by Altman, and Hirsch and Shmoys. These papers deal with certain fundamental questions concerning the reflection process.

Radiation from a flush-mounted type of antenna is considered by de Marchin and Tyras. Their model is an infinite conducting cylinder with a plasma-coated sheath. They show that the shape and symmetry of the radiation pattern is markedly affected by the strength of the applied d-c magnetic field.

The following four papers deal with various aspects of radiation and propagation in warm plasmas. Yeh and Cohen show the refractive index surfaces for the four modes which exist in a warm plasma. Balmain considers a short dipole in a compressible, isotropic, and lossy plasma. Wait is concerned with the excitation of electroacoustic waves in a compressible plasma and the possibility that surface waves at a rigid interface may exist by virtue of the finite temperature of the plasma. Seshadri also considers wave propagation in a compressible plasma, and he focuses his attention on the role of the ions.

The major sources of harmonic currents excited by an electromagnetic wave in a plasma are considered by Wetzel and Tang. They discuss physical orgins of these (nonlinear) interactions.

The final two papers deal with experimental studies. Saxton determines the effects of perturbing, weakly ionized, gaseous plasmas with acoustic waves produced by transducers. On the other hand, Narasinga Rao utilizes the cyclotron resonance absorption phenomenon to actually alter the "temperature" and the electron density of the plasma.

The following two issues of *Radio Science* will contain additional papers on "waves in plasma."

JAMES R. WAIT, *Editor.*