Abstracts

A Resonator Technique for Studying Dispersion in Longitudinally Magnetized Plasma Guides (Correspondence)

R.K. Likuski, P.D. Coleman and J.J. Stafford. "A Resonator Technique for Studying Dispersion in Longitudinally Magnetized Plasma Guides (Correspondence)." 1966 Transactions on Microwave Theory and Techniques 14.1 (Jan. 1966 [T-MTT]): 40-41.

A resonator technique has been developed for experimentally studying the dispersion characteristics of the angular symmetric modes with one and two radial variations in a circular, longitudinally magnetized plasma column. The resonator was made to resonate for both modes by varying the magnetic field, thus making an independent measurement of plasma density unnecessary for verifying theoretical calculations. A detailed cutaway cross-sectional drawing of one of the resonators is shown in Fig. 1. The plasma was formed by pulsing the cathodes negative with a 2-kilovolt pulse of 5 microseconds duration applied at a repetition rate of 60 cycles per second. The plasma thus formed decayed completely between successive pulses. A CW probing microwave signal was applied to one end of the resonator and the resonance was detected in the decaying plasma either by monitoring a sharp decrease in the reflected power or an increase in the transmitted power when the plasma density decayed to a value that caused the column to resonate. The oscilloscope traces of reflected power shown in Fig. 2 (a) and (b), in which time increases from right to left, are illustrative examples of the resonances obtained in such a resonator for modes with one and two radial variations, respectively. The second dip corresponds to a resonance; the one near the beginning of the trace, which is independent of magnetic field, has not been fully explained.

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