Abstracts

Application of a Microwave Technique to the Measurement of Electron Density and Relaxation Time

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The measurement of ionization rate and electron densities in thermally ionized gases attracted the attention of many scientists and engineers working in the aerospace field. Determination of these parameters is of importance not only in the field of communication with reentering bodies, but is also of vital importance in understanding combustion and other rapid chemical reactions. Initial ionization is usually attributed to collisions between molecules, but as the electron density increases, collisions between electrons and neutral particles may also become important or even dominant in the ionization process. Depending on the efficiency of molecular collision processes, on the physical and chemical properties of the gas and its purity, a time lag or relaxation time will result between the heating of the neutral gas and the attainment of equilibrium electron density. Since in a shock tube, samples of gas can rapidly be heated to temperatures in excess of 10/sup 4/ °K without introducing an excess of impurities, this kind of device is ideally suited for the above-mentioned studies.

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