Abstract

Digital Image Processing Technique (DIPT) is a widely used technique for image processing activities in digital communication. Its use as diagnostic tool is in recent use in many experimental researches, where emission spectroscopy plays a dominant role. In this work, we have projected DIPT as a low cost and non invasive probing technique to measure different
Measurement of Plasma Parameters using Digital Image Processing Technique

physical parameters like energy, temperature and density of a DC Glow Discharge Plasma. The radiative emission from DC Glow Discharge Plasma is normally in the visible range along with some infrared and ultraviolet emissions. The frequency of such radiations indicates the energy of the radiation. Different radiative processes in the plasma are responsible for the frequency band of the emission. The spectral distribution depends upon the homogeneity of the plasma also. By analyzing the image of plasma we can infer the spectral distribution due to emission from different regions of the plasma. Here, we have evaluated the matrix of rgb values of pixels of the plasma image. We have developed an approximate relation of the rgb to the wavelength of the spectra. The corresponding frequency matrix is then worked out from the derived wavelength matrix. Then considering a local thermodynamic equilibrium, the energy distribution matrix, which depends upon the local atomic processes, is calculated using the above frequency matrix. The surface plot of the temperature, density and the energy of the plasma have been shown in this work.

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Index Terms

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