



Measurement of neutral gas temperatures in nitrogen-corona discharges

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Abstract : The temperature of neutral gas of the nitrogen-corona discharge has been measured using a Mach-Zehnder interferometer. The variation of the optical path in the interferometer has been measured, together with the refraction index. Density variations were also calculated. Values of measured temperatures of the neutrals in the corona discharge were obtained under both positive and negative coronas.

Keywords : Temperature, Mach-Zehnder interferometer, Abel inversion, refractive index, corona.

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1. Introduction

A corona is a process by which a current develops from a high potential electrode in a neutral fluid, usually air, by ionizing that fluid so as to create plasma around the electrode. The ions generated eventually pass charge to nearby areas of lower potential, or recombine to form neutral gas molecules. Despite their shortcomings, corona discharge systems have many applications ranging from environmental cleanup processes to solid-state fans. The plasma diagnostics could be achieved by observing effects resulting from physical processes. This usually requires a rather elaborate chain of deductions based on an understanding of the physical processes involved [1]. In determining parameters of different types of plasma, it may not be appropriate to use material probes, as they may perturb the plasma. Electromagnetic wave probing is an alternatively non-perturbing technique [2]. Absorption spectra, infrared spectra, sound, ultra-sonic velocity and Raman scattering techniques were all used to measure gas

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