CHARACTERIZATION OF PULSED DIRECT CURRENT (PDC) AS DRIVING CIRCUIT FOR FRINGING ELECTRIC FIELD (FEF) SENSOR

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ABSTRACT

This thesis presents a study of Pulsed Direct Current (PDC) as driving circuit for Fringing Electric Field (FEF) sensor. This study is to implement the PDC concept on drive circuit of FEF as the PDC circuit has been designed, simulated and tested while connecting to FEF sensor. The voltage of PDC waveform is variable as it rises up and down along the wave and it maintains a single positive or negative polarity. The study is to investigate the characterization of using Pulsed Direct Current to drive the FEF sensor. Since the FEF sensors are widely used for non-invasive measurements, Pulsed Direct Current used as to make it more reliable and cost effective. This thesis also presents both simulation and experimental data to characterize the circuit on FEF sensor. The results show that the trend pattern of both simulation and experiment are similar as the capacitance is increasing, the peak-to-peak voltage increased. The results obtained also show that pulsed direct current has a linear capacitance-voltage characteristic when tested with ceramic capacitors and FEF sensors. Both output results for ceramic capacitor and FEF sensor in experiment are about the same.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Nowadays, pulsed direct current is useful in many modern DC equipment operations after it has been smoothed using capacitor that was charged to a specific voltage and then the voltage release as regular DC current to the circuit [1].

Pulsed direct current is a current that flows at a certain point in a circuit. During a first period of time, the PDC has a first significant constant magnitude then has at least one additional significant constant magnitude that is different from the first during at least one additional next period of time and may repeat [2].

As we know, pulsed direct current has characteristics of both direct current (DC) and alternating current (AC). The PDC power supply delivers a current of a single polarity with a variable voltage which is obtained using either a full-wave or half-wave rectifier. Pulsed direct current shares a characteristic with traditional AC current which the voltage is variable as it rises up and down along the wave but the difference is the polarity of the current does not change, the current maintains a single positive or negative polarity just like traditional DC current [1].