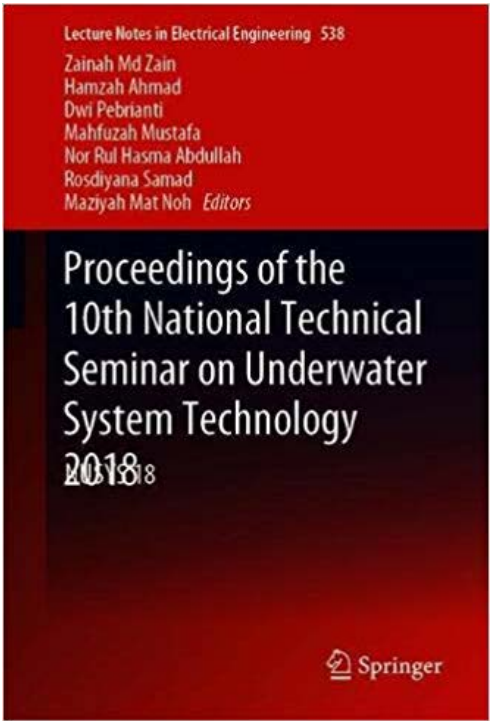

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Contents

Design of Ultra-Wideband (UWB) Horn Antenna for Non-destructive Fruit Quality Monitoring

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Abstract. This paper presents an ultra-wideband pyramidal horn antenna for non-destructive fruit quality monitoring system. The proposed design simulation operates in the frequency range of 3.1 GHz to 10.6 GHz. The antenna is supported by the rectangular waveguide feeder. The design is chosen based on the ability of the antenna to transmit and receive signal with wide bandwidth, high directivity and gain, and low Voltage Standing Wave Ratio. The antenna is designed and simulated by using Computer Simulation Technology Microwave Studio. The simulation result also validated by the experimental result. The simulation result shows that the proposed UWB pyramidal horn antenna exhibits small return loss with low VSWR as well as good radiation pattern in the frequency range of 3.1-10.6 GHz.

Keywords: Ultra-Wideband antenna, Horn antenna, Fruit quality, Non-destructive.

1 INTRODUCTION

Local fruit industry has a potential to export the fruits globally to accommodate demands on the fresh tropical fruits, e.g., mangoes, bananas, papayas, etc. Hence, it is necessary to ensure the quality of the fruits prior to export. The main fruit quality characteristics include, the level of maturity, ripeness, and moisture content. Traditional local technique normally characterizes the fruit quality by their appearance, which based on human gut feeling and their experiences. The quality can be very subjective to harvesters' experience. Some works have been done and adopted to characterize fruit quality based on electrical properties, which include complex permittivity. Those works are based on either infrared or radio frequency (RF), but the used power level is high. As a result, ionization of fruit flesh is undetermined, although those are claimed as non-destructive. Hence, a non-destructive and non-ionizing automatic detection system is in demand. Ultra-Wideband (UWB) is a promising RF technique to overcome all the above problems (including ionizing) and is suitable to be used for any kind of living things. UWB-based works have been done for early cancer detection successfully without any negative impact on human health [1].