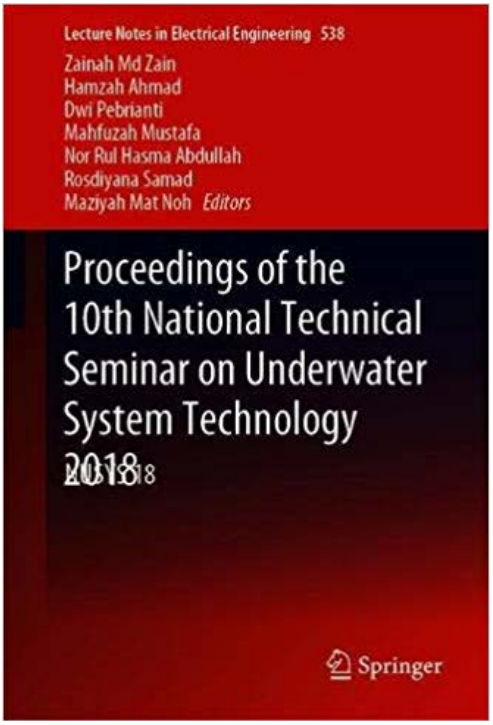

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Contents

Ionospheric Modeling and Precision Positioning Global Navigation Satellite System (GNSS)

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Abstract. In ionosphere, the total electron content (TEC) contributes a significant role in determining the scintillation. Ionospheric scintillation can affect severely in satellite-based navigation and communication systems. Thus, the study of TEC of ionosphere is very crucial. The correlation between TEN and temperature in different weather and time has been presented in this paper. The TEC data was taken from the global positioning system (GPS) receiver at University Malaysia Pahang, Malaysia (120'24.7388'E and 36'14.5310'N). TEC data was analyzed by the SPSS software and the results have shown that during dry weather, the TEC is highly correlated with temperature as compared to the rainy weather.

Keywor ds: Total electron content (TEC), Ionospheric scintillation, GNSS.

1 Introduction

The portion of atmosphere that holds charged particles is known as ionosphere and this region lies 70km to 1000km above the Earth. These ionized particles change their speed of propagation and trajectory when they react with a propagating electromagnetic wave [1]. There are some often occurred disturbances in the ionospheric region which are scintillation, travel ionosphere disturbance (TID), plasma bubble etc [2]. Ionospheric scintillation is the prompt alteration of amplitude and/or phase of global navigation satellite system (GNSS) signal when the ionospheric abnormalities are appeared [3]. Because of amplitude scintillations, the positioning accuracy of GPS may degrade and this phenomenon also causes the data loss in GPS receiver while the phase scintillation causes the phase lock loss [4]. The scintillation happening varies on some factors which are the regional time, season, magnetic and solar activity and magnetic latitude. At low latitudes and at high latitudes, the scintillation happening is the most severe [5-8]. TEC is another important feature in the ionospheric research and it is the total amount of electrons exist along the signal path from the GPS satellite to the receiver. The proper Ionospheric modeling contributes the largest role in navigation and communication systems based on satellite. If the ionospheric modeling is not sufficiently well, then it creates error in single frequency of GNSS receivers [9].