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Degree Ph.D

Title of Thesis

Characteristics of the Earth's electromagnetic fields to the response of the variations in the solar wind

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ABSTRACT

It has been known that sun ejecting parts of its mass into space these solar masses commonly known as solar wind. Solar wind composite of ionized particles in addition to accompanied magnetic field. Once the solar wind reaches the earth magnetosphere arise geomagnetic storms and activate earth's magnetic field due to currents induced in the earth's magnetosphere and lithosphere. The study of these magnetospheric electromagnetic fields is not an academic interest because the fields produce from these currents affecting geomagnetic survey processes and space technologies. The thesis focuses on the space electromagnetic fields during active sudden commencements and the equatorial ionospheric electron density variation in addition to suggesting a new technique to calculate the Pi2 geomagnetic pulsations propagation time on the earth surface. The thesis is organized in five chapters:

Chapter 1 gives basic information about the main sources of the earth magnetic field observed on the ground and the different coordinate systems used in thesis, in addition introductory part about the magnetospheric field model Tsyganenko model.

Chapter 2 gives a definition and explanation about the data sets which are divided into ground and space data in addition to different magnetic indices used in the current study. Also describes the cross wavelet analytical technique method used in the current study.

Chapter 3 presents the characteristics of the observed magnetic associated the Sudden Commencements (SC) observed by VAPs A/B and GOES 13/15 satellites in addition to modeling these data. Finally comparing the characteristics of the magnetic field at VAPs A/B satellites and GOES 13/15 satellites with the modeled one to validate the model in the interior of the magnetosphere.

Chapter 4 presents the characteristics of the Equatorial Ionospheric Anomaly (EIA) single crest observed by Swarm A satellite using 2 years electron density data. The EIA single crest is a preliminary study from Low earth orbit satellite. We present its features at different seasons and local time to give a reasonable reason behind its formation.

Chapter 5 present a new method to calculate the Pi2 propagation time between 2 station separated in latitude in addition to comparing this method with the cross correlation and the maximum time energy methods.