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FARADAY ROTATION, TOTAL ELECTRON CONTENT AND THEIR SENSITIVITY TO THE AVERAGE PARALLEL COMPONENT OF THE MAGNETIC FIELD.

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Extended Abstract:

A plane polarized electromagnetic (EM) wave that propagates through a plasma, (anti-)parallel to a magnetic field, suffers a gradual rotation of its plane of polarization called Faraday rotation (FR). Likewise, radio beacon signals that traverse the ionospheric plasma encounter a field-aligned component of Earths geomagnetic field and the anisotropy of the medium. The FR angle depends on the integrated electron density and the strength of the parallel magnetic field projection to the radio wave propagation direction. The integral is taken along the radio wave propagation direction over the entire path length. Therefore, accurate knowledge or a correct model for both the electron density and the magnetic field as well as the propagation trajectory is required for the interpretation of FR measurements. Many authors use the average value of the parallel magnetic field for estimation of FR from ionospheric total electron content (TEC) measurements. Although it is known that the strength of Earth's geomagnetic field varies slowly at ionospheric altitudes, a reference height characteristic value or characteristic mean value may not always be appropriate. This work considers alternative methods to establish a characteristic value for the average parallel component of the magnetic field, particularly when independent FR and TEC measurements are available.