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INTERPOLATION OF MAGNETIC FIELD CHARACTERISTICS BY SPLINE FUNCTIONS

Global Earth's Magnetic field is one of the most important things in planetary structure. Magnetic field is also one of the key elements for navigation purposes. Its parameters are extremely important for direction detection and other applications.

Modern navigation devices and sensors grounded on magnetic field characteristics use magnetic field models which do not contain data about human based part of magnetic field. That is why the aim of this work is to describe methodology of local magnetic field parameters measurement through the use of typical users equipment.

Usually magnetic field is characterized by intensity vector "T" is the sum of the vectors strengths of several fields. Typically, the vector T is estimated from its projections, on the some Cartesian coordinate system (Tx, Ty, Tz components). In addition, two angles are important: declination(D) and inclination(I), which indicate position of intensity vector in space, horizontal TH and vertical Tz components of T.

All sensors which we need can be found inside of typical tablet or in modern cell phone . That's way it is need 3 magnetometers (they will sense Tx, Ty, Tz components of intensity vector), 3 gyroses (to detect angular position of tablet) and positioning sensor – GPS (Global Positioning System) receiver (to data composition).

With the help of GPS receiver we measured: Height – a scalar value, in meters; Lat – scalar geodetic latitude, in degrees, where north latitude is positive and south latitude is negative; Lon - A scalar geodetic longitude, in degrees, where east longitude is positive, and west longitude is negative. With the help of Magnetic Field sensors – Tx, Ty, Tz – components of magnetic field vector in nanotesla (nT), usually. With the help of Gyroscope – rotation angle data. During an experiment were used a cell phone

Samsung Galaxy I9300 and free Android application "Data Recording" (for data collecting and storing). Unfortunately different sensors inside mobile phone have different time of measurements. To make this time problem clear it is necessary to interpolate coordinates in order to unify sensors data time.

At any location, the Earth's magnetic field can be represented by a three-dimensional vector. A typical procedure for measuring its direction is to use a compass to determine the direction of magnetic North.

All of these parameters are important for navigation and other magnetic field applications. That's why let's calculate declination, inclination and intensity for all input data. After that we will have these data across trajectory of mobile phone movement.

For data verification international world magnetic model has been used. The predicted state of intensity vector of magnetic field for local area of investigation has been calculated by NOAA data with the help of MATLAB specific software on the same date and time of real data measurement

Results of work indicate that mobile phone sensors can be used for real time magnetic field characteristics estimation.

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