GEOID

10xxxxxx.1

LEGAL RESTRICTIONS:

This Reusable Software Component (RSC) contains data with Unlimited Government Rights.

DESCRIPTION:

The purpose of GEOID is to support conversions between WGS84 ellipsoid heights and WGS84 Geoid heights.

CERTIFICATION LEVEL:

This RSC has been certified at level 4. A level 4 component satisfies the criteria for reliability, testing, and documentation for the Army Reuse Center (ARC). The component comes with test materials and a Reuse Manual that aids in integrating the component into a software system.

LEVEL OF TESTING/ACCEPTANCE:

Unit and integration testing have been performed for the functions contained in this component.

PURPOSE/INTENDED USE:

The purpose of GEOID is to provide a reusable component that supports the following coordinate conversions:

- WGS84 Ellipsoid height (meters) to Geoid height (meters) at the specified geodetic coordinates (latitude and longitude in radians), using the EGM96 gravity model, and
- WGS84 Geoid height (meters) to Ellipsoid height (meters) at the specified geodetic coordinates (latitude and longitude in radians), using the EGM96 gravity model.

A particular variation of the Geoid conversion is specified in terms of the following parameters:

- Longitude – Longitude (in radians) at the height conversion point,
- Latitude – Latitude (in radians) at the height conversion point.

HARDWARE/ENVIRONMENT CONSTRAINTS:

There are no hardware or environment constraints. There are no limitations.

FUNCTIONS:

Initialize_Geoid – This function reads Geoid separation data from a file in the current directory and builds the Geoid separation table from it.

Get_Geoid_Height – This private function returns the height of the WGS84 geode above or below the WGS84 ellipsoid, at the specified geodetic coordinates, using a grid of height adjustments from the EGM96 gravity model.

Convert_Ellipsoid_To_Geoid_Height – This function converts the specified WGS84 ellipsoid height at the specified geodetic coordinates to the equivalent Geoid height, using the EGM96 gravity model.

Convert_Geoid_To_Ellipsoid_Height – This function converts the specified WGS84 Geoid height at the specified geodetic coordinates to the equivalent ellipsoid height, using the EGM96 gravity model.

EXAMPLE APPLICATIONS:

The following example illustrates how Geoid can be used to convert Ellipsoid height to Geoid height and back again:

Function Call:

status = Initialize_Geoid()

Inputs:

None

Outputs:

None

Function Call:

status = Convert_Ellipsoid_To_Geoid_Height (Latitude, Longitude, Ellipsoid_Height, Geoid_Height)

Inputs:

Latitude: 35.0

Longitude: -75.0

Ellipsoid Height:

Outputs:

Geoid Height:

Function Call:

status = Convert_Geoid_To_Ellipsoid_Height (Latitude, Longitude, Geoid_Height, Ellipsoid_Height)

Inputs:

Latitude: 35.0

Longitude: -75.0

Geoid Height:

Outputs:

Ellipsoid Height: