

SINUSOIDAL

10xxxxxx.1

LEGAL RESTRICTIONS:

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

DESCRIPTION:

SINUSOIDAL is a C language code component that provides conversions between Geodetic coordinates (latitude and longitude) and Sinusoidal projection coordinates (easting and northing).

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 SINUSOIDAL is to provide a reusable component that supports the following coordinate conversions:

- Geodetic coordinates (latitude and longitude in radians) to Sinusoidal projection coordinates (easting and northing in meters), and
- Sinusoidal projection coordinates (easting and northing in meters) to Geodetic coordinates (latitude and longitude in radians).

A particular ellipsoid is specified in terms of the following parameters:

- Semi-Major Axis (a): Radius (in meters) at the equator, and
- Semi-Minor Axis (b): Radius (in meters) at a pole.

A particular variation of the Sinusoidal projection is specified in terms of the following parameters:

- Central Meridian – Longitude (in radians) at the horizontal center of the projection,
- False Easting – A coordinate value (in meters) assigned to the central meridian of the projection to avoid the inconvenience of using negative coordinates,
- False Northing – A coordinate value (in meters) assigned to the origin latitude of the projection to avoid the inconvenience of using negative coordinates, and

HARDWARE/ENVIRONMENT CONSTRAINTS:

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

FUNCTIONS:

`Set_Sinusoidal_Parameters` – This function sets the ellipsoid parameters and Sinusoidal projection parameters for the particular variation of the Sinusoidal projection that is to be used in subsequent coordinate conversion operations.

`Get_Sinusoidal_Parameters` – This function returns the current values of the ellipsoid parameters and Sinusoidal projection parameters.

`Convert_Geodetic_To_Sinusoidal` – This function converts the specified geodetic coordinates (latitude and longitude in radians) to Sinusoidal projection coordinates (easting and northing in meters) using the current ellipsoid parameters and Sinusoidal projection parameters.

`Convert_Sinusoidal_To_Geodetic` – This function converts the specified Sinusoidal projection coordinates (easting and northing in meters) to geodetic coordinates (latitude and longitude in radians) using the current ellipsoid parameters and Sinusoidal projection parameters.

EXAMPLE APPLICATIONS:

The following example illustrates how Sinusoidal can be used to convert Geodetic coordinates to Sinusoidal projection coordinates and back again:

Function Call:

```
status = Set_Sinusoidal_Parameters (a, b, Central_Meridian, False_Easting,  
False_Northing)
```

Inputs:

a	6378137.0
b	6356752.3142
Central_Meridian	0.0
False_Easting	0.0
False_Northing	0.0

Outputs:

None

Function Call:

```
status = Convert_Geodetic_To_Sinusoidal (Latitude, Longitude, Easting, Northing)
```

Inputs:

Latitude:	-35.0
Longitude:	75.0

Outputs:

Easting:	-1917051.56
Northing:	-3874592.9

Function Call:

```
status = Convert_Sinusoidal_To_Geodetic (Easting, Northing, Latitude, Longitude)
```

Inputs:

Easting:	-1917051.56
Northing:	-3874592.9

Outputs:

Latitude: -35.0

Longitude: 75.0