Slope-Map

Short description
Creates a slope map given an asteroid shape model, spin state and total mass
'ejectaGell' creates the slope map. Satisfies ALG-RS-015
Helper libraries include:
anal.a, elliptics.a, file.a, geometry.a, gravity.a, matrix.a, orbel.a, poly.a, twobody.a, unirotd.a, vector.a, visutils.a

Author of algorithm
Daniel Scheeres

Change History
V 1.0 Initial entry by Dan Scheeres

Detailed Description including error handling
The methodology underlying this algorithm can be found in:
D.J. Scheeres, Orbital Motion in Strongly Perturbed Environment: Applications to Asteroid, Comet and Planetary Satellite Orbiters, Chapter 10, Springer, 2012. pp 231-242

The methodology consists of taking a faceted shape model of an asteroid, its estimated spin state and epoch of evaluation, and the total mass or bulk density of the asteroid. The algorithm then proceeds to compute a range of conditions on the surface of the body, evaluated at the center of each surface facet. Included in these computations are the slope angle, the slope vector, the total and normal surface acceleration, the surface geopotential, and other quantities of potential interest.
The program is written in FORTRAN and accesses a number of support libraries that are written in FORTRAN and authored and developed by D.J. Scheeres over the last two decades.

Error codes are still being developed

Parameters
Input Parameters
Normalized moments of inertia
Spin state specification
Shape model vertex and face file
Total mass or bulk density

Output Parameters
Output file: NESC with entries
Entry Number Entry value
1 Face number (integer)
2 Face center position vector: x (km) *
3 y *
4 z *
5 Position latitude (deg) *

6 longitude (deg) *
7 radius (km) *
8 Face normal vector latitude (deg) *
9 longitude (deg) *
10 Jacobi energy (km^2/s^2)
11 Return speed (m/s)
12 Escape speed (m/s) *
13 Difference between escape and return speeds (m/s)
14 Jacobian potential speed (m/s) <-- "Potential" *
15 Slope (deg) *
16 Area (km^2) *
17 tangent surface acceleration (mm/s^2) *
18 normal surface acceleration (mm/s^2) *
19 total surface acceleration (mm/s^2) *
20 Jacobi distance 1
21 Jacobi distance 2
22 acceleration tangent angle (deg)
23 acceleration tangent magnitude
24 acceleration normal magnitude
25,26,27 slope vector
28 tilt angle
29,30,31 slant vector

Output file: NESCstat with Max/Min and lat/lon values for above quantities:
11, 12, 13, 17, 18, 19, 15, 28
and Average slope (15) and total surface area

Example call

~/ejectaGell-V