OBERON - OBliquity and Energy balance Run On Nbody systems

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Contents

1 Getting OBERON

OBERON is hosted on github at +++

2 Compiling OBERON

The source code is in the `/src` folder, which contains a `Makefile`. With the appropriate software installed, type 'make' to compile an executable.

3 Code Design

4 Input Options

4.1 Global Options

- `ParType 'Positional/Orbital'` The format of data for entry (either Cartesian co-ordinates for position and velocity or orbital elements)
- `NBodyOutput (string)` The filename for the N Body data file
- `SnapshotTime (double)` The time interval between data dumps and snapshots
- `NGridPoints: (integer)` The number of grid points used by the latitudinal energy balance model
- `MaximumTime: (double)` The maximum runtime of the simulation
- `SystemName: (string)` A descriptive string for the simulation
- `Number Bodies`: (integer) The number of bodies in the system
- `Restart: 'T/F'` is the simulation a restart? True or False (careful with this - not stable currently)
- `FullOutput 'T/F'` True: Output full snapshots as well as log files with surface averaged values for each body, False: log files only

4.2 Body Options (must be specified for each body)

- `BodyName: (string)`
- `BodyType: 'Star/Planet/World'`
- `Mass: (double)`
- `Radius: (double)`

For Positional Files:

- `Position: (double) (double) (double)` Cartesian position vector (astronomical units)
- `Velocity: (double) (double) (double)` Cartesian velocity vector (2π *AU/yr)

For Orbital Files:

- `SemiMajorAxis: (double)` Semimajor Axis (AU)
- `Eccentricity: (double)` Eccentricity

- `Inclination: (double)` Inclination (+++units?+++)
- `LongAscend: (double)` Longitude of the Ascending Node
- `Periapsis: (double)` Argument of Periapsis
- `MeanAnomaly: (double)` Mean Anomaly
- `OrbitCentre: (integer)` Where is the initial orbit focus? -1 = (0,0,0), 0=system centre of mass, 1,2,3... = Body 1,2,3)

4.2.1 Star Options

- `Luminosity (double)` Bolometric Luminosity (solar luminosity)

4.2.2 World Options

- `RotationPeriod (double)` World rotation period in days
- `Obliquity (double)` initial obliquity in degrees
- `WinterSolstice (double)` orbital longitude of the winter solstice (degrees)
- `OceanFraction (double,` $[0.0 \rightarrow 1.0]$`)` Fraction of the world's surface that is ocean
- `InitialTemperature (double)` Initial surface temperature of the world (at all latitudes)
- `IceMeltingOn 'T/F'` Is latent heat of melting for ice accounted for in climate calculation? True or False

5 Outputs

:

- `<WorldName>.<number>` - a snapshot of `<WorldName>`'s latitudinal climate properties
- `<WorldName>.<log>` - a log file for `<WorldName>` tracking globally averaged climate properties and position/orbital properties