INTRODUCTION TO ORBITAL MECHANICS - MODEL & SIMULATION SOFTWARE (OM-MSS)

Earth, Sun, Moon & Satellites Motion in Orbit - Model & Simulation Software

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(This is Introduction, pp 1 - 5, of Orbital Mechanics - Model & Simulation Software (OM-MSS), Sec 1 to 10, pp 1 - 402.)

INTRODUCTION : Orbital Mechanics - Model & Simulation Software (Om-Mss)

A Monograph of Earth, Sun, Moon & Satellites Motion in Orbit with Examples, Problems and Software Driven Solutions.

We look into space from Earth, which is 3rd planet from Sun. Earth takes around 365.25 days to moves around Sun in an Elliptical orbit.

The average distance from the Earth to the Sun is called one Astronomical Unit (AU); 1 AU = 149,597,870.7 km.

Mars, is 4th planet from Sun, that takes 686.971 Earth days to orbit around Sun. The orbital path of Mars is highly eccentric.

Mars & Earth move along their orbits, and come near to one another approximately every two years. This approach of coming near facilitate launching of spacecraft every two years, even that takes about eight months to reach Mars.

Example : On Apr. 08, 2014, the near or close distance between Mars and Earth was 92.4 million km.

Moon moves around Earth in the same kind of orbit. The Moon is the Earth's only natural Satellite.

The average distance of the Moon from the Earth is 384,403 km.

A Satellite is an artificial object, intentionally placed into orbit. Thousands of Satellites are launched into orbit around Earth.

A few Satellites called Space Probes have been placed into orbit around Moon, Mercury, Venus, Mars, Jupiter, Saturn, etc.

Understanding the motion of Earth around Sun, and the motion of Moon and Satellites around Earth is of interest to many.

Presented here a Monograph of 'ORBITAL MECHANICS - MODEL & SIMULATION SOFTWARE (OM-MSS)', to Simulate Motion of Sun, Earth, Moon & Satellites.

The OM-MSS Software is written in 'C' Language, the Compiler used is Dev C++ and the Platform is a Windows 7, 64 bit Laptop.

The Source Code, around 30,000 Lines, is Compiled. The 'OM-MSS.EXE' File generated is of Size 1.5 KB.

The Executable File, < OM-MSS.EXE >, is RUN Step-by-Step for a Set of Inputs. The Results seen on Computer Screen are put in a File, Which in effect becomes **'A Monograph of Orbital Mechanics with Examples, Problems and Software Driven Solutions'.**

The execution of 'Orbital Mechanics - Model & Simulation Software (OM-MSS)', illustrates its Scope, Capability, Accuracy, and Usage.

The OM-MSS Software is quite exhaustive for beginners, experts, researchers & professional in Spherical Astronomy.

The source code of OM-MSS Software in full or in parts has a cost if there is buyer. The cost has not been evaluated / decided.

The OM-MSS Software includes the following :

(a) Astronomical Time Standards and Time Conversions Utilities :

GMT - Greenwich Mean Time, **LMT** - Local Mean Time, **LST** - Local Sidereal Time, **UT** - Universal Time,

ET - Ephemeris Time, **JD** - Julian Day, **Standard Epoch** J2000, **Gregorian Calendar** date and more.

(b) Positional Astronomy of Earth, Sun, Moon, and Satellites Motion in Orbit, includes computations of :

* Position of Sun and Position of Earth on Celestial Sphere at Epoch ;
* Keplerian elements : Inclination, RA of asc. Node, Eccentricity, Arg. of Perigee, Mean Anomaly, Mean Motion;
* Motion Irregularities : Mean, Eccentric and True anomaly in deg;
* Precise Time at Earth Orbit Points : Perihelion, Aphelion, Equinoxes, Solstices, Semi-Major & Minor-axis;
* Astronomical years : Anomalistic, Tropical, and Sidereal Years;
* Four Seasons : Spring, Summer, Autumn and Winter start time and duration;
* Position of Satellites around Earth : Keplerian elements and State Vectors at epoch, and computing,
  Sub-Sat point lat/log, EL & AZ angles, Distances, Velocity, and more;
* Satellite Pass, Ground Trace for Earth Stn using NASA/NORAD 2-line bulletins;

(c) Customized Utilities and products : On special request either developed or configured and generated.

These are Presented in Section - 1 to 8. The Section - 9 Containes References, and Section - 10 Containes few related Diagrams.

Next : Content Index Table.

Index Table : OM-MSS Sections / Sub Sections, Pages & Titles. (the page number is same as seen in the pdf document status bar)

Move on to Section (1 to 9) While the Executable File, < OM-MSS.EXE >, is RUN for a Set of Inputs.