`mxd`
Basic Conceps

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1 Orbital Elements

In this section we explain some orbital element sets and how to convert to and from different sets.

1.1 Cartesian Elements

The Cartesian elements are

$$\vec{r}(t), \vec{v}(t). \tag{1}$$

They define position and velocity at a given time.

1.2 Keplerian Elements

The Keplerian elements are.

$$a, e, i, \omega, \Omega, f(t). \tag{2}$$

They define semimajor axis, eccentricity, inclination, right ascension of the ascending node, argument of periapsis, and true anomaly. Notice that only true anomaly varies with time.

TODO: Explain what is an osculating orbit.

TODO: Explain why the given elements only apply to elliptical (non-circular, non-parabolic, non-hyperbolic) orbits.

1.3 Cartesian-Keplerian Conversion

TODO: How to get from Cartesian to Keplerian elements.

1.4 Keplerian-Cartesian Conversion

TODO: How to get from Keplerian to Cartesian elements.

2 Basic Vector Algebra

TODO: Add basic vector algebra

3 Drawing Conic Sections

TODO: Explain how would one go about drawing a conic section (which is in a plane) in some three-dimensional frame.