



Kepler's Ellipses: Challenges From Compasses to Computer Algebra

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Abstract:

In 300 years the special case of planetary motion in a circular orbit is the only exact solution of planetary motion to have been found. To find $x(t)$, $y(t)$ for the more general case of an elliptic orbit, it is necessary to use approximate numerical methods, employing the transcendent equation $t=t(E)$ named after Kepler. Another method which can be employed in looking for the exact solution of the equation of motion in inverse square force field is parametric set of expressions: $t=t(E)$, $x(E)$, $y(E)$. The solution is time cycloid, proposed by Newton in famous PRINCIPIA, but never used.
