1 Refutation of Einstein General Relativity orbit

define radius function r(theta) of a precessing ellipse

(%i1) r = alpha/(1+epsilon*cos(x*theta));

(%o1) $r=\frac{\alpha}{\varepsilon\cos(\theta\,x)+1}$

multiply by (epsilon*cos(x*theta)+1)

(%i2) %*(epsilon*cos(x*theta)+1);

(%o2) $r(\varepsilon\cos(\theta\,x)+1)=\alpha$

divide by r

(%i3) %/r;

(%o3) $\varepsilon\cos(\theta\,x)+1=\frac{\alpha}{r}$

subtract 1

(%i4) %-1;

(%o4) $\varepsilon\cos(\theta\,x)=\frac{\alpha}{r}-1$

divide by epsilon

(%i5) %/epsilon;

(%o5) $\cos(\theta\,x)=\frac{\frac{\alpha}{r}-1}{\varepsilon}$

simplify

(%i6) expand(ratsimp(%));

(%o6) $\cos(\theta\,x)=\frac{\alpha}{\varepsilon\,r}-\frac{1}{\varepsilon}$

transform cos to sin by using theorem sin(x)^2 + cos(x)^2 = 1

(%i7) sin(x*theta)^2 = 1 - cos(x*theta)^2;

(%o7) $\sin(\theta\,x)^2=1-\cos(\theta\,x)^2$

insert result above for cos(x*theta)

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(%i8) sin(x*theta)^2 = 1 - (alpha/(epsilon*r)-1/epsilon)^2;
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(%o8) $\sin(\theta\, x)^2 = 1 - \left(\frac{\alpha}{\varepsilon\, r} - \frac{1}{\varepsilon}\right)^2$

work out square of sum and take common denominator

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(%i9) radcan(%);
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(%o9) $\sin(\theta\, x)^2 = \frac{(\varepsilon^2 - 1)\, r^2 + 2\,\alpha\, r - \alpha^2}{\varepsilon^2\, r^2}$

simplify

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(%i10) expand(%);
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(%o10) $\sin(\theta\, x)^2 = \frac{2\,\alpha}{\varepsilon^2\, r} - \frac{\alpha^2}{\varepsilon^2\, r^2} - \frac{1}{\varepsilon^2} + 1$

This expression has to be eqated with the result of EGR

```
(%i11) E: (2*alpha)/(epsilon^2*r)-alpha^2/(epsilon^2*r^2)-1/epsilon^2+1 =
       (alpha/(x*epsilon))^2*(1/b^2-1/a^2+r0/a/r-1/r^2+r0/r^3);
```

(%o11) $\frac{2\,\alpha}{\varepsilon^2\, r} - \frac{\alpha^2}{\varepsilon^2\, r^2} - \frac{1}{\varepsilon^2} + 1 = \frac{\alpha^2 \left(\frac{r0}{a\, r} + \frac{r0}{r^3} - \frac{1}{r^2} + \frac{1}{b^2} - \frac{1}{a^2}\right)}{\varepsilon^2\, x^2}$

multiply by epsilon^2*x^2

```
(%i12) E*epsilon^2*x^2;
```

(%o12) $\varepsilon^2 \left(\frac{2\,\alpha}{\varepsilon^2\, r} - \frac{\alpha^2}{\varepsilon^2\, r^2} - \frac{1}{\varepsilon^2} + 1\right) x^2 = \alpha^2 \left(\frac{r0}{a\, r} + \frac{r0}{r^3} - \frac{1}{r^2} + \frac{1}{b^2} - \frac{1}{a^2}\right)$

It is seen that the left hand side is a polynom of maximum degree 1/r^2 while the right hand side is one of maximum degree 1/r^3. Both sides can never be equal for a certain range of r. However the variable r must be able to vary because it describes an ellipse - reduction ad absurdum.

Plot of precessing ellipses

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(%i14) r: alpha/(1+epsilon*cos(x*theta));
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(%o14) $\frac{\alpha}{\varepsilon \cos(\theta\, x) + 1}$

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(%i39) r1: ev(r, [alpha=1, epsilon=0.2, x=1]);
       r2: ev(r, [alpha=1, epsilon=0.2, x=1.1]);
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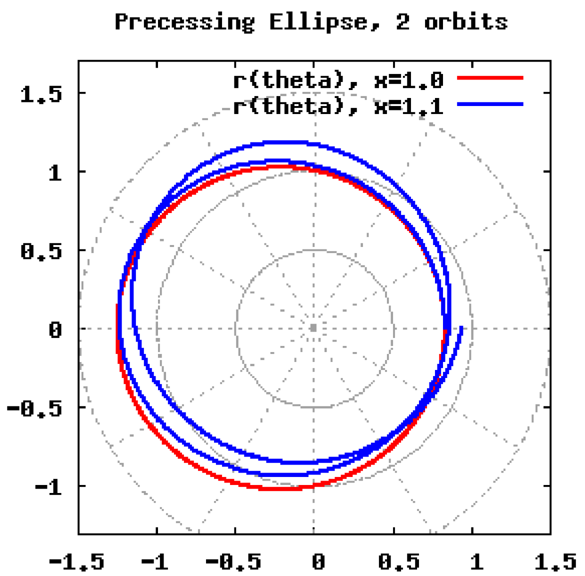
(%o39) $\frac{1}{0.2\cos(\theta)+1}$

(%o40) $\frac{1}{0.2\cos(1.1\,\theta)+1}$

2 Orbital Plots

```
(%i48) wxdraw2d(user_preamble = "set grid polar; set size square;",
                 nticks        = 1000,
                 line_width    = 2,
                 xrange        = [-1.5,1.5],
                 yrange        = [-1.3,1.7],
                 title         = "Precessing Ellipse, 2 orbits",
       key            = "r(theta), x=1.0",
       color          = red,
       polar(r1, theta, 0, 4.*%pi),
       key            = "r(theta), x=1.1",
       color          = blue,
       polar(r2, theta, 0, 4.*%pi))$
```

(%t48)



(%i51)
```
wxdraw2d(user_preamble = "set grid polar; set size square;",
                  nticks         = 1000,
                  line_width     = 2,
                  xrange         = [-1.5,1.5],
                  yrange         = [-1.3,1.7],
                  title          = "Precessing Ellipse, 12 orbits",
      key             = "r(theta), x=1.0",
      color           = red,
      polar(r1, theta, 0, 24.*%pi),
      key             = "r(theta), x=1.1",
      color           = blue,
      polar(r2, theta, 0, 24.*%pi))$
```

(%t51)