Refutation of Einsteinian general relativity with m theory

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3 Computation and graphics

The Euler-Lagrange equations for the potential of the Coates spiral have been solved, giving the trajectories of a mass m in the potential energy

$$U(r_1) = -\frac{m\,k}{2\,{r_1}^2}, \tag{39}$$

defined in the space (r_1, ϕ). The factor of 1/2 has been introduced to obtain the radial force

$$F(r_1) = -m\frac{\partial U(r_1)}{\partial r_1} = -m\frac{k}{{r_1}^3}. \tag{40}$$

In observer space (r, ϕ) the variable r_1 has to be replaced by $r/\sqrt{\mathrm{m}(r)}$. The potential has to be re-defined appropriately in m space and gives an additional force term:

$$U(r) = -m\,k\frac{\mathrm{m}(r)}{2\,r^2}, \tag{41}$$

$$F(r) = m\,k\left(\frac{d\,\mathrm{m}(r)}{dr}\frac{1}{2\,r^2} - \frac{\mathrm{m}(r)}{r^3}\right). \tag{42}$$

The additional force term is caused by $d\mathrm{m}(r)/dr$ and represents a spacetime or vacuum force inferred by m theory.

We have solved the Evans-Eckardt equations in Lagrangian form in four cases:

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1. non-relativistic limit with m(r)=1,
2. non-relativistic limit with exponential m(r),
3. ultra-relativistic limit with m(r)=1,
4. ultra-relativistic limit with exponential m(r).

The equations of motion are those of UFT 420 but computed for the potential (41). The m function was that of Eq. (79) in UFT 419. As already discussed in earlier papers, the derivative of m(r) introduces chaotic behaviour and makes the results very sensitive to the initial conditions. It was possible to use the same initial conditions for cases 1, 2 and 4 but not for case 3. The resulting orbits are graphed in Figs. 1-4. The non-realtivistic limit was realized by setting the velocity of light c to a high value. Obviously effects remain so that the spiral in Fig. 1 has a crossing point. Using an m function m$\neq$ 1 in Fig. 2 changes the result drastically. The ultra-relativistic case in Fig. 3 changes the asymptote to a completely different direction. Using the m function (Fig. 4), the direction is changed again, including a crossing point similar to that in Fig. 1. The velocity curve of case 4 is graphed in Fig. 5 (as a time trajectory). It is seen that the velocity moves asymptotically to a constant value, as known experimentally from spiral galaxies and refuting Einsteinian general relativity.

As an example in (r_1, ϕ) space we have repeated the calculations of case 4 with potential (39) the corresponding equations of motion. It was quite difficult to find non-trivial states, i.e. bound states in spiral-like form. One result is graphed in Fig. 6 where the trajectory describes exactly one loop around the centre. Recalculating the observer variable r according to

$$r = r_1 \sqrt{m(r_1)} \tag{43}$$

shows that a deviation between both coordinates is visible only near to the centre where the m function significantly differs from unity. The same effect is seen for the angular momenta (Newtonian and relativistic) which differ only in this region by a peak of the Newtonian value. A similar result holds for the total energies (Fig. 8). It can be seen that the relativistic energy is a negative constant, i.e. a bound state. Since the orbit is highly non-Newtonian, there is a huge deviation when the mass moves near to the centre.

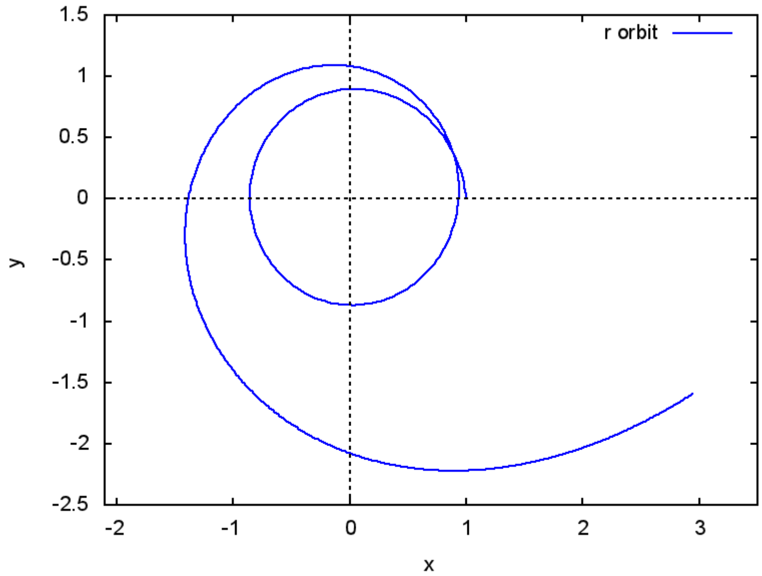

Figure 1: Orbits of Coates spiral in non-relativistic limit with m(r)=1.

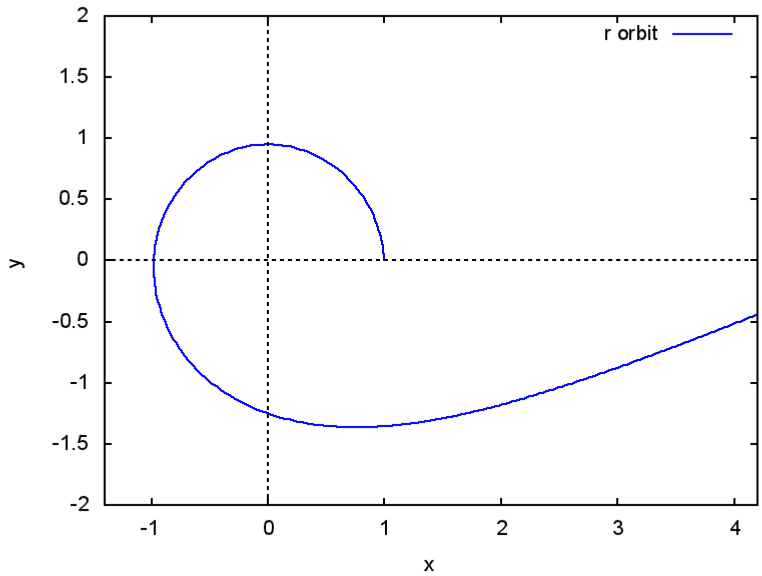

Figure 2: Orbits of Coates spiral in non-relativistic limit with exponential m(r).

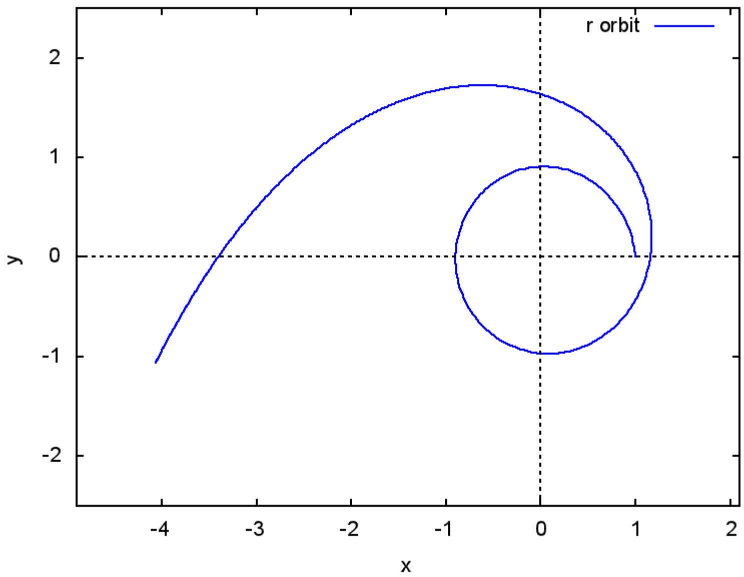

Figure 3: Orbits of Coates spiral in ultra-relativistic limit with m(r)=1.

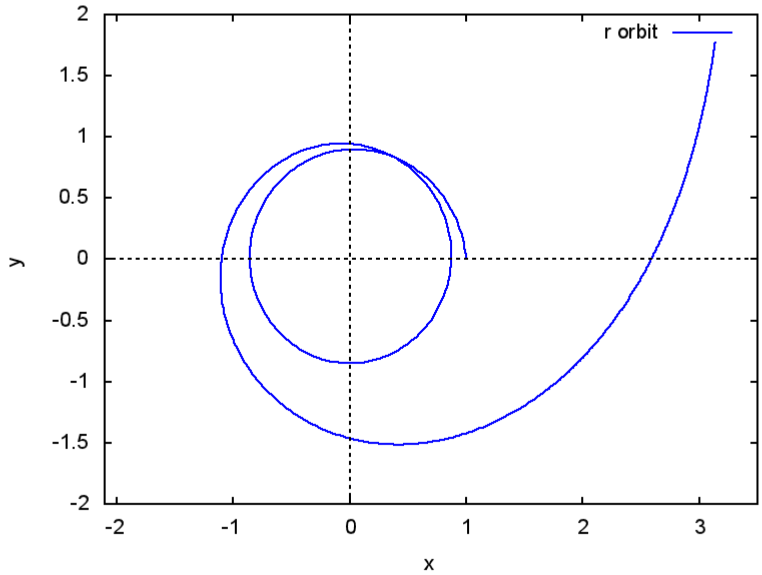

Figure 4: Orbits of Coates spiral in ultra-relativistic limit with exponential m(r).

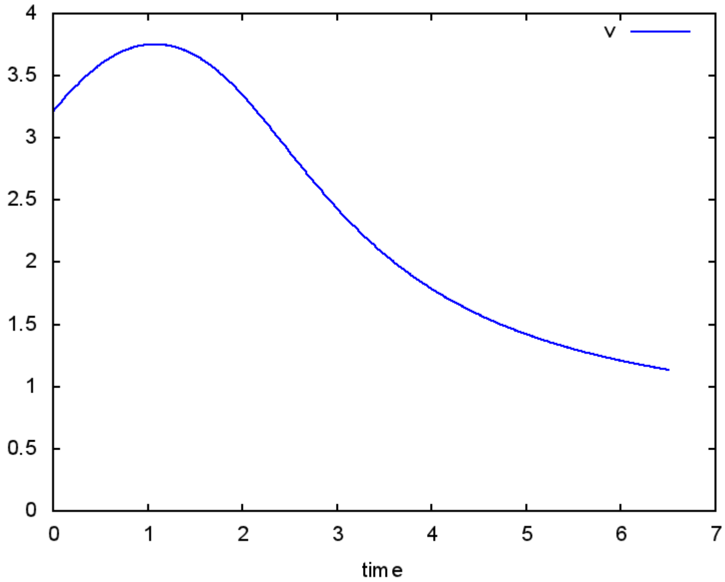

Figure 5: Velocity curve belonging to Fig. 4.

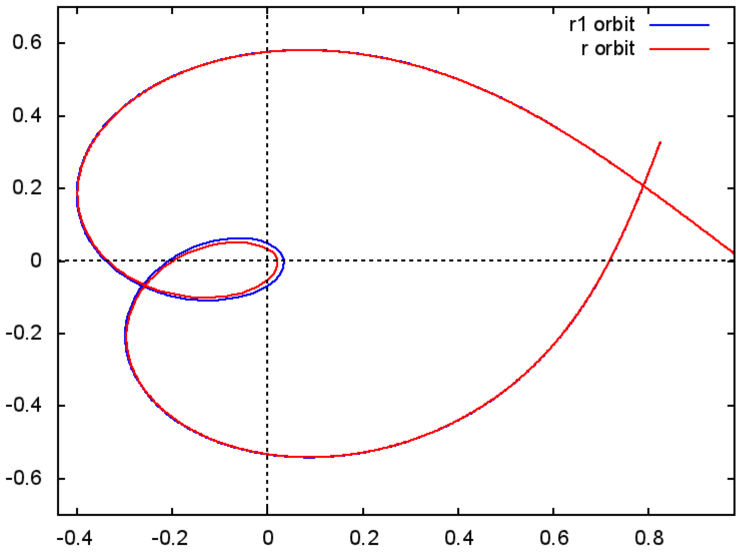

Figure 6: Orbits of Coates spiral in space (r_1, ϕ), ultra-relativistic limit with exponential m(r).

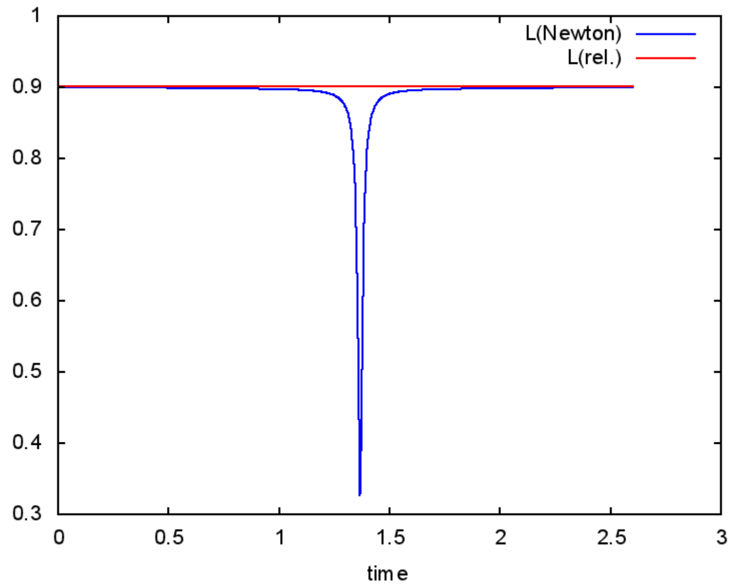

Figure 7: Angular momenta of Coates spiral in Fig. 6.

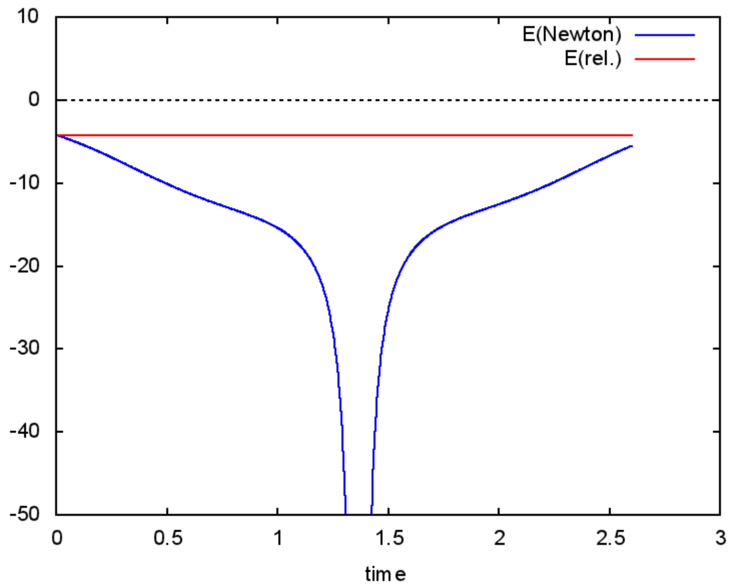

Figure 8: Total energies of Coates spiral in Fig. 6.