The m theory in Hamilton dynamics

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3 Numerical and graphical analysis

In section 2 a differential equation for m(r_1) has been derived. in Eq. (28) it contains orbit variables r_1 and $\dot{\phi}$ which have been reduced to r_1 by inserting the angular momentum which is constant. The result is Eq. (30). In addition there is a dependence on γ which is a function of the coordinates again. Since γ is near to unity in moderatedly relativistic systems, we have assumed $\gamma = 1$, leading to a differential equation for m(r_1) which only depends on r_1, i.e. it is an ordinary differential equation:

$$\frac{d\,\mathrm{m}\,(r_1)}{dr_1} = -\frac{2L^2}{c^2\,m^2\,{r_1}^3}\frac{(1+\mathrm{m}\,(r_1))}{(1-\mathrm{m}\,(r_1))}. \tag{31}$$

This equation can be solved numerically. It is to be observed that the right hand side of the equation becomes singular for m(r_1) = 1. Therefore it was not possible to integrate over this point. We can only consider cases where m stays above or below unity. The results are graphed in Figs. 1 and 2. We integrated from right to left, i.e. started at $r_1 = 1$ in both cases. In the first case (Fig. 1) m drops to 1 for a certain radius and gets undefined below this radius. In the second case (Fig. 2) m diverges for this radius, this means it rises to 1, then it is undefined. This is different from the supposed behaviour that for m< 1 it drops further, ending at m=0.

There is an additional problem when inserting values for the constants L etc. from the solution of the Hamilton equations as should be done for reasons of consistency. There is only a valid range for L which is well below the value obtained from the solution of the equations of motion. This shows that the current calculation should only be considered as a first try to obtain m(r_1), thus avoiding a phenomenological function.

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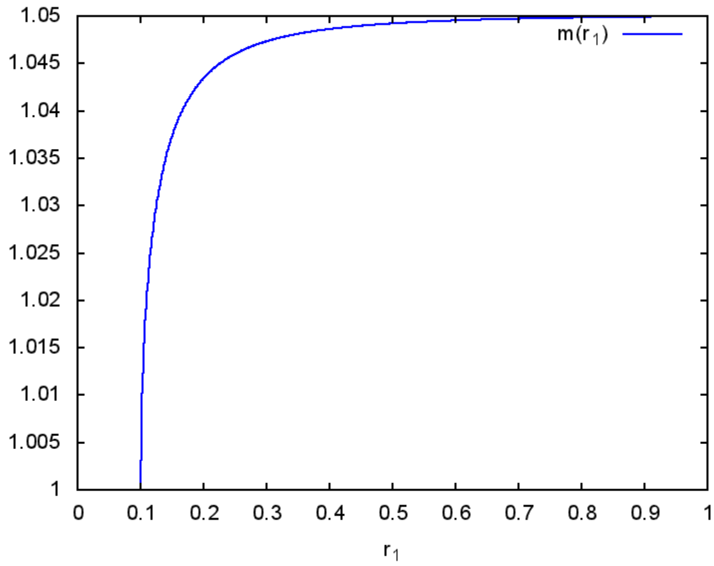

Figure 1: m function for a starting value $m(1) > 1$.

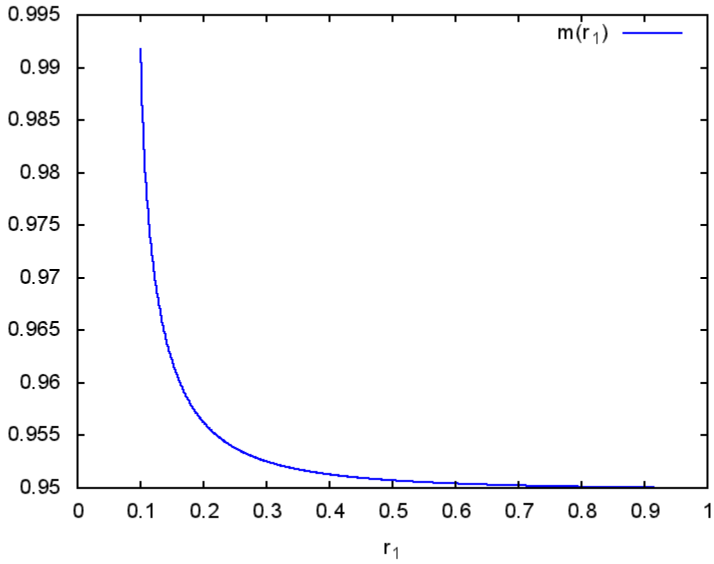

Figure 2: m function for a starting value $m(1) < 1$.