On the quantum decomposition of the planet Mercury's orbit path

S. Halayka*

Monday 3rd June, 2024 09:28

Abstract

By quantizing the gravitational time dilation using various step sizes, one obtains a set of weighted paths. The precession associated with each weighted path combines to provide the same answer as the classical analytical solution.

1 Introduction

The kinematic time dilation is:

$$\frac{d\tau}{dt} = \frac{\sqrt{c^2 - ||\vec{v}||^2}}{c} = \sqrt{1 - \frac{||\vec{v}||^2}{c^2}}. \tag{1}$$

The gravitational time dilation is:

$$\frac{d\tau}{dt} = \sqrt{1 - \frac{R_s}{r}}. \tag{2}$$

$$\delta_p = \frac{6\pi GM}{c^2(1-e^2)a} \left(\frac{1}{\pi \times 180 \times 3600}\right) \left(\frac{365}{88} \times 100\right) = 42.937 \tag{3}$$

Step size (e.g. epsilon) in general is $\epsilon = 2^{-m}$ where m is the number of mantissa bits.

References

[1] Halayka. On simulating the four Solar System tests of general relativity using two-parameter post-Newtonian gravitation with Euler integration. (2024)

*sjhalayka@gmail.com

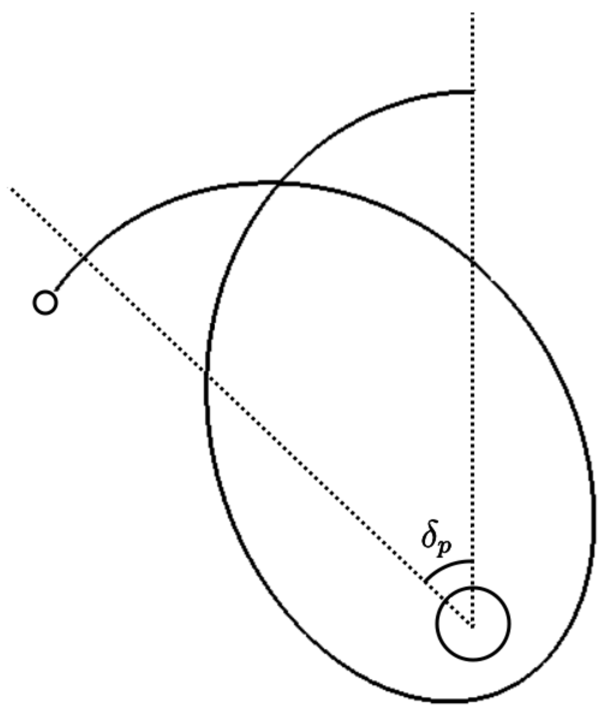

Figure 1: A diagram showing precession, where the orbit does not quite form a closed ellipse.