A proposal to avoid a leap second

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1. None

The method is shown to avoid the leap second, which needs no special operation for almost persons.

1. Decrease of rotational angular velocity: The maximum rotational angular velocity of the earth at the origin of the earth, is expressed by the following formula, because the centrifugal force caused by the angular velocity ωo should be less than gravity.

(In the following, **: power)

\[ r \times \omega^2 = g \]

where Radius of the earth \( r = 6378100 \text{ m} \)

Standard gravitational acceleration \( g = 9.80665 \text{ m/s}^2 \)

Substituting these into the above,

\[ \omega_o = 1.2400 \times 10^{-3} \text{ rad/sec} = 107 \text{ rad/day} \]

At this value the force balances with the gravity.

The present earth has

\[ \omega_p = 7.292 \times 10^{-5} \text{ rad/sec} \]

Where \( \omega_o \) decreases exponentially,

\[ \log (\omega_o / \omega_p) = - k t \]

Substituting followings into the above,

\[ \omega_o / \omega_p = 1.240 \times 10^{-3} / 7.292 \times 10^{-5} = 16.98 \]

\[ \log (\omega_o / \omega_p) = 2.833 \]

and the earth's age

\[ t = 4.55 \text{ bil. years} = 1.436 \times 10^{17} \text{ secs} \]

We get

\[ k = 1.973 \times 10^{-17} / \text{sec} = 6.226 \times 10^{-10} / \text{year} = 0.623 / \text{bil.year} \]

In past 15 years, the leap second has been substituted five times. Where the present period is \( T_0 \), the period \( T \) after three years is expressed as follows:

\[ T - T_0 = 1 \text{ sec} \]

\[ T - T_0 = 2\pi(1/\omega - 1/\omega_o) = 2\pi (\omega_o - \omega) / (\omega \times \omega_o) \]

Substituting the following into the above,

\[ \omega = \omega_o e^{-kt} \]

We get

\[ 2\pi / \omega(1-e^{(-kt)}) = 1 \text{sec} \]

i.e. \( \omega / 2\pi = 1-e^{(-kt)} = kt \)

Substituting \( \omega = \omega_p = 7.292 \times 10^{-5} \text{ rad/sec} = 2301 \text{ rad/year} \)

and \( t = 3 \text{ years} \),

we get

\[ k_p = 3.869 \times 10^{-6} / \text{year} \]

Substituting the above into (1), the present half-period of the earth is calculated as follows:

\[ \log 0.5 = 0.6931 = 3.869 \times 10^{-6} \times 6 \times T_p \]

\[ T_p = 0.6931 / 3.869 \times 10^{-6} = 1.791 \times 10^{15} \text{ years} = 180 \text{ thousands years} \]

This value contradicts with the earth's age of 4.55 bil. years, that is caused by the inappropriate
The present second is defined as the 9192631770 times of one period $T_0$ of radiant wave from Cs, whose frequency is 9.192631770 GHz. The leap second becomes unnecessary for more than hundred years, where the one second is made longer than present one, as follows: where we make the present radiant frequency $f = 9.192631770$ GHz from Cs, (1+1sec/3 years = 1+1.0563 $\times 10^{-8}$) times, and 9.192631673 GHz, because three years are about eighth power of ten (3 years = 0.9467 $\times 10^8$ sec). Then the leap second becomes unnecessary, where the last three digits of the effect numbers of ten are changed to 9192631673, then
\[
\frac{9192631770}{9192631673} = 1+1.056\times10^{-8}
\]
and one second becomes longer 1.056$\times10^{-8}$, namely present one second becomes loner about one second for three years.

2. Effects of the change of time unit

The basic unit, speed of light, is unchanged, where the unit of meter is changed to become shorter by 0.76$\times10^{-8}$ m, caused by the second longer by 1.056$\times10^{-8}$ sec.

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