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Causes of sound wave on the moon

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***Abstract*— This paper propose the time and place of producing sound waves on the moon.**

***Index Terms*— Moon, Sound wave, Gravitational wave, Angular velocity, Vibration**

I. INTRODUCTION

It can produce sound waves on the moon is because of the interaction of two vibration caused by the gravitational wave。One of the gravitational waves source is relatively fixed, another kind of gravitational waves is moving, which results gravitational acceleration and air vibration. This leads to the vibration of vortex and airflow of dynamic synthesis of gravitational wave. A part of the energy of gravitational waves transform into the energy of sound waves.

Conclusion：the place to produce sound waves on the moon is through a path to the center of the moon and parallel the earth revolution axis（It is a circle）. The time of generating sound waves on the moon is 2015+19*n（n is an integer）.

II. ZHE YIN'S GRAVITATIONAL WAVE THEOREM

2.1 Theorem 1（Existence theorem）：There are two points，A and B. A is the gravitational field of the source. B is a point in the gravitational field. The necessary and sufficient condition for the existence of gravitational waves at B is the existence of energy rotational motion at A.（Including a neutron, an atomic nucleus, or a planet）. The direction is the direction of B in the direction of the tangent line，whose limit of convergence is point A.

Proof：Set the distance between A and B is r，if A and B are static，there is only a physical quantity "distance r"，there will be no waves. When and only when the rotational motion can generate speed and energy. That is, the velocity of B (Vb)has a function relation with the angular velocity of A($d\theta$).

$Vb = f(d\theta, r)$, when $\Delta t \to 0$ and $\Delta\theta \to 0$，then we have

$$Vb = \frac{dr}{dt} = \lim_{\Delta\theta\to 0} \frac{[f(\theta+\Delta\theta), r] - [f(\theta), r]}{\Delta\theta},$$

That means A is the source of gravitational waves，B is in the field of the gravitational waves emitted by A. 2（Stability theorem）：A is the source of gravitational waves. B is a point in the gravitational field of A. The sufficient and necessary condition for the existence of a stable gravitational wave at B is：

$$\frac{dr}{d\theta} = b$$，（b is a constant）

Proof：derived from theorem1，we have

$$Vb = \frac{dr}{dt} = \lim_{\Delta\theta\to 0} \frac{[f(\theta+\Delta\theta), r] - [f(\theta), r]}{\Delta\theta},$$

The necessary and sufficient condition for the stability of gravitational waves is the velocity stability at B.

The necessary and sufficient condition for the stability of the velocity at B is the stability of the angular velocity of A.

The necessary and sufficient condition for the stability of the angular velocity of A is that the angular velocity of A is proportional to the velocity of B. That means

$$\frac{Vb}{d\theta} = \frac{dr}{d\theta} = b$$，（b is a constant）

We have $r = a + b\theta$, ...（1）

Formula (1) is the equation of gravitational waves，which is trajectory of gravitational waves.

Corollary of theorem 2：If a gravitational wave trajectory to satisfy the Archimedes spiral, the gravitational wave must be stable.

We have $r = a + b\theta$.

Where r is the distance from A to B，A is a spiral length from A to B，b is the distance between the spirals.

The energy of gravitational waves on the rotating shaft is the strongest gravitational wave energy. The earth is a satellite of the moon. The angular velocities of them are equal. The moon is the moon's rotation axis through the center and a line parallel to the axis of rotation of the earth. Revolution of the moon produce and accept the sun's gravity wave line is through the center of the moon, and are parallel to the earth sun public shaft line.

For the moon，the axis of rotation of the north pole is fixed point. The moon around the sun public shaft pole trajectory is a dynamic circle. So, the moon against rotation gravity wave, acceleration maximum, produce the gas moving vortices of sources of gravitational waves is on the moon the sun shaft Arctic point trajectory（a circle）.

III. PERIODIC LAW OF THE SUN,MOON AND EARTH

Theorem 3：The necessary and sufficient condition of the moon, the earth and the sun's periodic movement is stable is the three periods are in the positive integer multiple relationship. They have the least common multiple.

Proof ：Define the physical quantity --- variable force impulse: real time variable size and direction of force vector and time product called variable force impulse.

Set the time period of the moon, the earth and the sun is T1, T2, T3.

Set the variable force impulse of the moon, the earth and the sun is P1, P2, P3. The force vector of the moon, the earth and the sun is F1, F2, F3.

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Set the closed orbit of the moon, the earth and the sun is L1, L2, L3.

Set the area of the moon, the earth and the sun's closed orbit is called S1, S2, and S3.

Set time variable t, we divide the time interval [0，T1] arbitrarily into n small intervals，

$[0,t_1]$, $[t_1,t_2]$,..., $[t_{i-1},t_i]$,..., $[t_{n-1},t_n]$,where $t_n = T_1$。 Take a pot $\xi_i(1,2,...,n)$ in each $[t_{i-1},t_i]$. The force $f(\xi_i)$ at the point ξ_i is used as the approximate value of the interval $[t_{i-1},t_i]$, and the approximate value of the variable force impulse is $f(\xi_i)(t_i - t_{i-1})$. So the approximate value of the variable force impulse from 0 to T1 on the trajectory of L1 is. $\sum_{i=1}^{n} f(\xi_i)\Delta t_i$.

When the time interval is divided infinitely, the limit value of the length of the length of the interval is limited; it is the impulse of the change of the moon's orbit.

$$P1=F1*T1=\lim_{\substack{n\to\infty \\ \max\Delta t_i\to 0}} \sum_{i=1}^{n} f(\xi_i)\Delta t_i = \oint\limits_{\substack{L1 \\ 0-T1}} f(t)dt = S1(\text{const ant})$$

Similarly, the revolution of variable force impulse trajectory period on earth is P2=S2 (constant).

In the same way, the variable force impulse of the sun's movement track is P3=S3 (constant).

Variable force impulse of the moon, the earth, and the sun's movement cycle is constant. If the moon, the earth and the sun's periodic movement are in the positive integer multiple relationship and if they have the least common multiple, Then there must be a stable variable force impulse so that the value of the variable force impulse of the moon, the earth and the sun in the least common multiple time is constant. That means the necessary and sufficient condition of the moon, the earth and the sun's periodic movement is stable is the three periods are in the positive integer multiple relationship. They have the least common multiple.

Lunar New Year's Day：January 1st with respond to the unit of the lunar periodicity.

The moon is a satellite of the earth. The earth revolves around the sun. Then solar motion is also a periodic movement. Or we can say the solar motion and the solar system's eight planets motion have periodicity.

According to Theorem 3，we will calculate the motion periodicity of the sun next.

There are many books such as China calendar, such as reference 1. They included the control data of hundreds or thousands of years with the lunar calendar.，In this paper, which only from 1901 to 2050 150 years Lunar New Year's Day (lunar January 1st) and the statistics of the calendar control. This doesn't affect the search for the periodic law of the sun, and the data from other years have no influence on the results of the study.

The moon travels round the earth once a month (30 days). The earth's orbital period is 365 days and 11 hours. In table 1, we have statistical data of Lunar New Year's Days from 1901 to 2050.[2]

Table 1. The Lunar New Year's day (NYD)and A.D Contrasting statistics（Month/Day）

Year AD	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
Lunar NYD	2/19	2/08	1/29	2/16	2/4	1/25	2/13	2/2	1/22	2/10
Year AD	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Lunar NYD	1/30	2/18	2/6	1/26	2/14	2/3	1/23	2/11	2/1	2/20
Year AD	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
Lunar NYD	2/8	1/28	2/15	2/5	1/24	2/13	2/2	1/23	2/10	1/30
Year AD	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Lunar NYD	2/17	2/6	1/26	2/14	2/4	1/24	2/13	1/31	2/19	2/8
Year AD	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
Lunar NYD	1/27	2/15	2/5	1/25	2/13	2/2	1/22	2/10	1/29	2/17
Year AD	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Lunar NYD	2/6	1/27	2/13	2/3	1/24	2/12	1/31	2/17	2/6	1/28
Year AD	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Lunar NYD	2/15	2/5	1/25	2/13	2/2	1/21	2/9	1/30	2/17	2/6
Year AD	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Lunar NYD	1/27	2/15	2/3	1/23	2/11	1/31	2/18	2/7	1/28	2/16
Year AD	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Lunar NYD	2/5	1/25	2/13	2/2	2/20	2/9	1/29	2/17	2/6	1/27
Year AD	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Lunar NYD	2/15	2/4	1/23	2/10	1/31	2/19	2/7	1/28	2/16	2/5
Year AD	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Lunar NYD	1/24	2/12	2/1	1/22	2/9	1/29	2/18	2/7	1/26	2/14
Year AD	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Lunar NYD	2/3	1/23	2/10	1/31	2/19	2/8	1/28	2/16	2/5	1/25
Year AD	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Lunar NYD	2/12	2/1	1/22	2/10	1/29	2/17	2/6	1/26	2/13	2/3
Year AD	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Lunar NYD	1/23	2/11	1/31	2/19	2/8	1/28	2/15	2/4	1/24	2/12
Year AD	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Lunar NYD	2/1	1/22	2/10	1/30	2/17	2/6	1/26	2/14	2/2	1/23

Through simple programming calculation, it can be concluded that the 150 year cycle of the Lunar New Year's Day is 19 years, 38 years and 57 years. Lunar cycle and revolution of the earth the relationship between cycle cycle and cycle of solar motion is integer times cycle time cycle is 19*n years (n = natural number). That is, the minimum movement period between the sun and the other planets in the solar system is 19 years.

It can be known that the change of the earth's environment has 19-year periodicity.

In Table 2, from 1901 to 2050, we divide the Lunar New Year's Day clustering data as the same periodicity into 19 groups.

Table 2. The Lunar New Year's Day (1901---2050) is divided into 19 groups of the same cycle data and the difference between the groups（Month/Day）

Group 1 1901（2/19）1920（2/20）1939（2/19）1958（2/17）1977（2/18）1996（2/19）
2015（2/19）2034（2/19） Difference between the next group：11 days
Group 2 1902（2/8）1921（2/8）1940（2/8）1959（2/8）1978（2/7）1997（2/7）
2016（2/8）2035（2/8） Difference between the next group：10 days
Group 3 1903（1/29）1922（1/28）1941（1/27）1960（1/28）1979（1/28）1998（1/28）
2017（1/28）2036（1/28）Difference between the next group：18 days
Group 4 1904（2/16）1923（2/15）1942（2/15）1961（2/15）1980（2/16）1999（2/16）
2018（2/16）2037（2/15）Difference between the next group：10 days
Group 5 1905（2/4）1924（2/5）1943（2/5）1962（2/5）1981（2/5）2000（2/5）
2019（2/5）2038（2/4） Difference between the next group：10 days
Group 6 1906（1/25）1925（1/24）1944（1/25）1963（1/25）1982（1/25）2001（1/24）
2020（1/25）2039（1/24）Difference between the next group：18 days
Group 7 1907（2/13）1926（2/13）1945（2/13）1964（2/13）1983（2/13）2002（2/12）
2021（2/12）2040（2/12）Difference between the next group：11 days
Group 8 1908（2/2）1927（2/2）1946（2/2）1965（2/2）1984（2/2）2003（2/1）
2022（2/1）2041（2/1） Difference between the next group：10 days
Group 9 1909（1/22）1928（1/23）1947（1/22）1966（1/21）1985（2/20）2004（1/22）
2023（1/22）2042（1/22）Difference between the next group：18 days
Group 10 1910（2/10）1929（2/10）1948（2/10）1967（2/9）1986（2/9）2005（2/9）
2024（2/10）2043（2/10）Difference between the next group：10 days
Group 11 1911（1/30）1930（1/30）1949（1/29）1968（1/30）1987（1/29）2006（1/29）
2025（1/29）2044（1/30）Difference between the next group：18 days
Group 12 1912（2/18）1931（2/17）1950（2/17）1969（2/17）1988（2/17）2007（2/18）
2026（2/17）2045（2/17）Difference between the next group：11 days
Group 13 1913（2/6）1932（2/6）1951（2/6）1970（2/6）1989（2/6）2008（2/7）
2027（2/6）2046（2/6）Difference between the next group：10 days
Group 14 1914（1/26）1933（1/26）1952（1/27）1971（1/27）1990（1/27）2009（1/26）
2028（1/27）2047（1/26）Difference between the next group：18 days
Group 15 1915（2/14）1934（2/14）1953（2/13）1972（2/15）1991（2/15）2010（2/14）
2029（2/13）2048（2/14）Difference between the next group：11 days
Group 16 1916（2/3）1935（2/4）1954（2/3）1973（2/3）1992（2/4）2011（2/3）
2030（2/3）2049（2/2）Difference between the next group：10 days
Group 17 1917（1/23）1936（1/24）1955（1/24）1974（1/23）1993（1/23）2012（1/23）
2031（1/23）2050（1/23）Difference between the next group：18 days
Group 18 1918（2/11）1937（2/13）1956（2/12）1975（2/11）1994（2/10）2013（2/10）
2032（2/11）Difference between the next group：11 days
Group 19 1919（2/1）1938（1/31）1957（1/31）1976（1/31）1995（1/31）2014（1/31）
2033（1/31）Difference between the next group：19 days

Noting：The error sources of a day or so in the A.D calendar every four years we will add a day. But the mathematical expectation of every 19 year period's error is equal to zero.

Differences between adjacent groups are 11, 10, 18, 10, 10, 18, 11, 10, 18, 10, 19, 11, 10, 18, 11, 10, 18, 11 and 19. We find that difference between the Group 19 and the Group 1 is most special and is a group of the latest New Year's Day. And followed by the Group 11 and the Group 12. It shows as Figure 2.

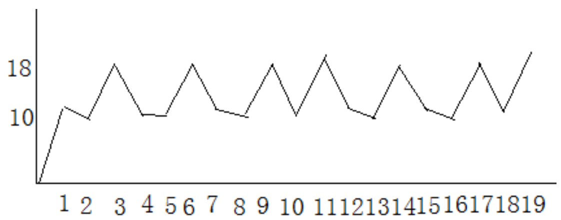

Figure 2. Inter group variation diagram (group and days)

We conclude that the most obvious year of climate change is the Group 1. Namely the year of 1920, 1939, 1958, 1977, 1996, 2015, and 2034. The second is Group 12，namely the year of 1912, 1931, 1950, 1969, 2008, 2026 and 2045. obviously，the years of obviously climate change and their adjacent years are the most serious natural disasters years[3，4].

IV. CONCLUDING REMARKS

For the sun，to some extent because of the relative motion of the moon revolves around the earth's angular velocity is equal，we can consider the earth and the moon as a whole. The earth will produce environmental changes impact on the moon. It is sure that the frequency and wavelength of the sound waves on the moon is the same with the sound waves of winter in Alaska.

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