

Keywords

Repulsion interaction; Repulsion field;
Accelerated expansion of the universe;
Physical mechanism of energy coupling
between sun and earth; Polar shift; Dark
energy

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Discovery of the Repulsion Interaction and Origin Association of the Accelerated Expansion of the Universe

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Abstract

In 2015, the Chinese scholar Song Guanyi put forward the theory of repulsion interactions. The discovery of repulsion interactions opens up a new way to study the origin of the universe expansion. This paper systematically introduces

- The mathematical expression and characteristics of the repulsion interaction
- The energy source, existence state and energy magnitude of the repulsion interaction in the solar system
- The existence evidence of the repulsion interaction observed on the earth
- Throughout the universe, the magnitude of the energy level that drives the universe to expand and the characteristics of the expansion velocity of the stars (or galaxies) in the universe

The paper analyzed that the existence of the repulsion interaction provides necessary and sufficient conditions for the accelerated expansion of the whole universe, and the energy emitted by all stars in the universe is most likely to be the "dark energy" that the physical and astronomical circles are concerned about today.

Preface

In the 1940s, in order to solve the expansion of the universe, theoretical physicist G. Gamow, based on the theory of general relativity and the observation facts that the universe is expanding, proposed the theory of the Big Bang. In 1965, the discovery of the microwave background radiation in the universe added a great reputation to the Big Bang theory. For more than 80 years, the Big Bang theory has been accepted by most physicists, and considered as the standard model of relativistic cosmology. But on December 25, 2021, the Weber telescope went into the vast space and in July 2022 through the Weber telescope, the experts identified six early-stage galaxies that have already existed around within 500-700 million years after the Big Bang and, based on the observational data analysis, all the masses of the six structures are larger than the sun's mass for 10 billion times, and one is even larger for 100 billion times. Astronomers at the University of Melbourne and the University of Pennsylvania initially suspected themselves of making mistakes, but after another detailed examination and effort, the conclusion is correct. Overall, the measurements show that the distant galaxy world has already existed shortly after the Big Bang. However, this is only half the true image of the universe, these galaxies may have actually formed earlier, and experts believe it will take about more than 10 billion years to grow to the observed scale. This unexpected discovery proves that our understanding of the mysteries of the universe is too little to explain the properties of the early universe, and it means that the theory of Big Bang cosmology has come to an end.

Given some of the cosmological theories that we have summarized with our finite observations of the universe, most models of the universe are from front to back, i.e. starting from the perfectly defined beginning of the Big Bang and playing back to the present universe. However, S W Hawking et al. considered: "We cannot know the original state of the universe birth. Instead, we only know the final state of the universe, where we are now". The discovery of the repulsion interaction (light pressure) opens up a new way to study the origin of the expansion of the universe. This paper systematically introduces the mathematical expression of the repulsion interaction and its characteristics; the energy source, the state of existence and the magnitude of the energy in the solar system; the evidence of the repulsion interaction observed on the earth; the energy magnitude that drives the expansion of the universe and the characteristics of the expansion velocity between stars (or galaxies) in the universe; the analysis of the repulsion interaction and the origin association of the accelerated expansion of the universe.

The Discovery of (Light Pressure) Repulsive Interaction

Stars are celestial bodies in the universe that are powered by nuclear fusion and can heat and shine by themselves. The energy generated by the internal nuclear fusion inside stars is mainly transmitted by the carrying of the light quantum, thus forming an independent energy field of the light quantum as a medium particle, and forming a new type of basic relationship between the energy field radiated by the star and the material world. Because the force shown by this basic relationship is repulsion, it is called as the repulsion interaction and it is a kind of the basic natural force that exists objectively in the material world. In 2015, it was first discovered by Chinese scholar Song Guanyi [1,2]. Its mathematical expression is as follows:

$$F = (1 + K) \frac{3J_S}{4\pi R^3}$$

The law of repulsion interaction is described as follows: The energy radiated by any star in the universe can form an energy field centered on the body of the star, which is repulsive on any object (planets and interstellar matter) outside the body of the star. The magnitude of the repulsion is proportional to the product of the energy emitted by the star itself per second and the light surface area received by the irradiated object, and it is inversely proportional to the cube of the distance between the star and the radiated object. J is the energy emitted by the star itself per second; S is the illumination surface area received by the radiated object; R is the distance between the star and the radiated object; K is the average reflectivity of the photon on the surface of the radiated object; and is the circumference ratio.



After the gradual discovery of four natural forces (namely, gravitational interaction, electromagnetic interaction, strong interaction and weak interaction) in nature, the repulsion is the fifth one. Its characteristics are as follows:

- It exists between the main body of any star and everything in the surrounding space
- It is manifested as the repulsion (force)
- The magnitude of the repulsion accepted by the radiated object is only related to the energy radiated by the main body of the star and the light surface area received by the radiated object. It is unrelated to the main body mass of the star and the mass of the irradiated object
- The energy source of repulsion comes from the mass-energy conversion (nuclear fusion) reaction inside the main body of the star. The law of mass-energy transformation follows the mass and energy relationship proposed by A. Einstein in 1905 ($E = mc^2$)
- Media particles are photons
- It is the long-range force
- Under the usual circumstances, it only plays a significant role in the motion and evolution of objects (planets and interstellar matter) in the space occupied by stellar systems.

The Repulsion Interactions within the Solar (Stellar) System

The energy source of repulsion interaction in the space occupied by the solar system

The sun is a very common star in the universe, and the energy radiated by the sun forms an independent energy field centered on the main body of the sun. The energy of the sun's repulsion on all objects in its system (planets and interstellar matter) is the thermonuclear reaction in the main core of the sun. To estimate according to the mass-energy relationship that more than 4 million tons of material mass in the sun is converted into repulsive action energy through thermonuclear reaction every second. Since the formation of the solar system till now about 5 billion years passed, and during the time the repulsion energy released by the mass-energy conversion inside the sun can reach the magnitude of 0.6×10^{44} J, equivalent to the energy that 100 earths' mass matter has been converted into through thermonuclear reaction.

The existence state and the magnitude of the energy radiated by the main body of the sun in the space occupied by the solar system

So far, astronomers are not yet sure how much space the solar system occupies. It was originally thought that Pluto was located at the boundary of the solar system, about 5.5 light-hours in distance to the main body of the sun, i.e. the solar system is about 11 light-hours in diameter. Later, the discovery of Kuiper belt expanded the diameter of the solar system to about 70 light hours. If the supposed Oort Cloud has existed, the solar system might be more than a light-year in diameter. If estimated by gravitational influence, the solar system can be about four light-years in diameter. According to astronomical observations, the star closest to the solar system is the Proxima Centauri. The light quanta emitted from Proxima interior require 4.2 light years' journey to reach the earth.

Based on the fact that the diameter of the solar system is about 4 light years, the repulsion energy (dynamic energy) stored (kept) within the solar system can reach 2.36×10^{34} J, namely all the energy released by thermonuclear reaction within the sun during about two years. All the energy released by the thermonuclear reaction in the interior of the sun is divided into two parts. One part acted on the space matter in the solar system (planetary and interstellar matter) to maintain the basic framework of the solar system and the other part radiated to the space outside the solar system. The energy radiated by many other stars into the space occupied by the solar system is already very weak. It is mostly the energy carried by (redshift) light quanta which have had a long-time travel and lost a lot of energy (called cosmic microwave background radiation).

The magnitude of the repulsion action energy (radiated by the main body of the sun) received by the earth's surface

The energy received by the earth surface per second is 1.7×10^{17} J (it amounts to one out of 2.2 billion of total solar radiation energy). Since the formation of the earth (about 4.5 billion years), the crust surface (including the atmosphere) has received the solar radiation energy of 1.0×10^{34} J. It is equivalent to the sum of energy generated by the thermonuclear reaction (mass energy conversion, $E = mc^2$) inside the sun in one year. Such a huge order of magnitude of energy, which acts directly to the earth surface through the light quantum transfer, is three orders of magnitude larger than the sum of all the energies (such as rotational energy, gravitational energy, thermal energy generated by the decay of radioactive elements and crystallization energy) stored (not yet fully released) in the interior of the earth.

Evidence of Repulsion Action (Solar Pressure) Observed on the Earth

Evidence from the space probe

- On July 7, 2010, Zhejiang Daily reported: "In 1687, Issac Newton published his theory of gravitation, but in the past few decades, observations and experiments have discovered a new and interesting "gravity" phenomenon. On Mars, there are three radio transponders very similar to those used on planes. The transponders are mounted on the Pirate 1 lander, the Pirate 2 lander and the Mars Pathfinder probe, so the scientists of NASA's space exploration network can measure the distance between the landers and earth. The astronomical unit-the average distance between the sun and the earth is considered as an astronomical constant. Scientists use the radar ranging technology to measure the distance between the earth and other planets and, furthermore, to obtain the numerical values of astronomical units. The astronomical units measured by astronomers have already had 11 valid digits, making them the most accurate astronomical constants ever measured. After analyzing a lot of observations data, astronomers have found that the astronomical unit grows by 7 meters per every century, in other words, the earth is leaving the sun at that rate. After considering the four basic interactions known in nature (gravitational interactions, electromagnetic interactions, strong interactions and weak interactions), astronomers still cannot explain this phenomenon. Although scientists believe there are explanations for these solar system anomalies, no one can give a clear source (cause). One point of view is that perhaps this anomaly phenomenon will promote scientists to discover a new fundamental interaction in nature."

The above observations prove that the space occupied by the solar system has been in an expanding state since its generation, and the existence of (solar pressure) repulsion action can provide a theoretical explanation for the increase of distance between sun and earth (expansion of the solar system). Based on the generation age of the solar system of about 5 billion years, the average distance between sun and earth in the original solar system has increased by at least more than 450,000 kilometers.

- On October 4, 1957, the Soviet Union launched the first man-made earth satellite, announcing that human had entered the space age. The observation of navigation satellites shows that the driving force received by satellites in space is not only the aspherical gravity from the earth, the gravity of the moon and the gravity of the sun etc., but also found another kind of driving force, namely the solar radiation pressure (repulsive force). Observational data prove that the higher the satellite orbit is, the larger influence the pressure of solar radiation has. With the development of satellite positioning and navigation system, the influence of solar radiation pressure perturbation on the satellite orbit movement is more and more prominent, thus making the solar radiation pressure modeling of satellites become a current research hotspot [3].



In terms of its mass and size, the satellite is only a very insignificant dust in the solar system, but it can still be classified into the category of cosmic objects. Unlike other celestial bodies, artificial satellites are equipped with radio transponders, through which people can accurately observe the trajectory of the satellites. The fact that the influence of solar radiation pressure on its orbit can be observed on such a small object is enough to prove the objective existence of strong (solar pressure) repulsion interactions in solar system space.

Evidence from the geophysical discipline

- a) In 1891, American astronomer S. C. Chandler, based on the analysis of polar shift movement observations accumulated over more than 200 years, found that the polar shift spectrum has two main peaks, one at about 12 months and the other around 14 months, the latter is known as the famous Chandler period. The discovery of Chandler's period has attracted the attention of many geophysicists around the world, and they agreed that the excitation force of Chandler's swing must come from the interior of the Earth. However, after nearly a hundred years of exploration by scientists, almost all the force sources of the earth itself that may stimulate the swing of the rotation axis relative to the crust have been verified one by one, and the excitation source of force matching the Chandler's swing cycle has never been found. In 1988, Australia's famous geophysicist K. Lambeck pointed out in his book "The Earth's Variable Rotation" (The book summarizes the achievements of geophysicists around the world on the source of Chandler swing excitation source): "Until now Chandler swing excitation source problem has not been determined, but all agree that it may be a movement maintained by a less regular anniversary excitation force source". Therefore, the excitation source problem of Chandler swing is listed as one of the geophysical problems that need to be solved in the 21st century.

In 2006, Song Guanyi found that when the sunlight reaches the earth's surface, based on the significant difference in the reflection coefficient of the solar radiation on the crust surface (the reflection coefficient of ocean surface is about 1%, and the average reflection coefficient of land surface is about 30%), naturally, the pressure (repulsion) of the sun radiation to the earth will be divided into P1 and P2: P1 is the equivalent light pressure received by the land and ocean surface of the earth crust; P2 is the difference between the light pressure values received between the land and the ocean surface (it is only generated on the land). Song Guanyi acted the annual variation value of P1 (based on the cause of the sun's return movement) on the south and northern axes of the earth's rotation. The swing cycle of the earth rotation axis calculated by the optical pressure impulse moment method is 365.24 days (that is, about 12 months); he acted the annual variation value of P2 (based on the cause of the sun's regression movement) on the south and northern axes of the earth's rotation, the swing period of the rotation axis calculated by the optical pressure impulse moment method is 427 days (i. e., near 14 months); Because P1 and P2 act simultaneously on the earth crustal surface, when the sun's return movement comes at a period (one tropical year), the composite period of the rotation axis swing jointly stimulated by P1 and P2 is 395 days (≈ 0.92 period / year). This value is exactly consistent with the annual change period of astronomical observations [4]. At this point, the "anniversary changing force source that excites Chandler's swing" has finally been found.

The solution of the problem of the excitation source of Chandler's swing completely breaks through the long-held traditional thinking mode of geophysics that the excitation source of Chandler's swing comes from the interior of the earth and provides the geophysical evidence for the objective existence of the repulsion interaction (solar pressure).

- b) Seasonal variation of the earth's rotation velocity has always been a topic of interest to astronomers and geophysicists.

In the 1950s, the world many related scientists have made great efforts to study the cause of seasonal variation of the earth's rotation velocity. At the beginning, the understanding of scientists for the cause of seasonal variation of the earth's rotation velocity is clear, namely under the constant angular momentum, the change of rotational inertia is the root cause of the seasonal variation of the earth's rotation velocity. So, scientists considered almost all the excitation functions (such as atmospheric circulation, underground water, oceans, and earthquakes) that could cause a seasonal redistribution of mass. Some results obtained can seemingly explain the seasonal change of the earth's rotation speed, but it is difficult to believe that they

are the main excitation sources. Until 1974, a research team led by Chinese astronomer Ye Shuhua conducted an in-depth study on the above excitation functions over the years and asserted that "In the past, all the excitation factors, which seemingly caused the seasonal changes of the earth's rotation rate, seem to be not the main sources".

The earth's axis of rotation changes its position in space under the action of external forces, in one part because of the change in angular momentum, which is a forced swing, such as precession. The other part is the rotation of the earth itself, called free swing (free nutation). For free nutation, the angular momentum is invariant, but the rotation axis can vary. The change of the earth's rotation axis is the result of changes of its rotary inertia, changes of its rotation speed, or the redistribution of its angular momentum in the earth interior. Under the condition of free nutation, there are many factors that can stimulate the variation of the rotary inertia of the earth, but the most important factor, which can stimulate the polar shift, has not been found. So, the cause of the seasonal variation of the earth rotation speed naturally cannot be solved.

After Song Guanyi [4] found the sun pressure P1 and P2 the research on the cause of polar shift made a breakthrough. In 2007 and 2011, Song Guanyi consecutively published two articles: "Annual changes in the speed of the earth's rotation" and "Analysis of the main causes of the seasonal changes in the earth's rotation speed". At this point, the main factor of the seasonal variation of the earth's rotation speed was satisfactorily solved.

Evidence from geodynamics

Geodynamics is a science of studying the stress state and dynamical evolution of the earth in motion. It is the study of various mechanical processes, force sources and force characteristics of media in the large-scale motion or integral movement of the earth. The task of geodynamics is to reveal the dynamic sources of various geological processes and the energy conversion mechanism in the evolution of the earth. The ultimate goal of geodynamics is to understand the past, present and future behavior of the earth as a whole in its own system (solar system), and to use these understandings to provide the material and environmental foundations for the sustainable development of human survival.

Since the 1940s, the study of geodynamics has attracted the attention of scholars around the world: some have studied the tectonic movement of the crust and its mechanics from the perspective of geotectonic (including geomechanics). Some focus on the mantle convection, sea bed expansion, continental drift, polar shift, solid tide and free oscillation of the earth, and others even study the theoretical seismology together with geodynamics. By the end of the 20th century, scholars from various countries have organized a geodynamics program. For example, in 1989, the proposed a rese Department of Natural Sciences of the United State search program called "the National Research Program of the Mainland Dynamics". The program focuses on the following 16 problems: what are the dynamic characteristics of the continent; what actions control the growth and composition of the continent; what are the physical processes during the continental deformation; what are the dynamic mechanisms of producing large earthquakes, etc. [5]. Summarizing above a series of so-called earth dynamics research contents, it can be seen as follows: Although the schools of earth scientists hold the different perspectives and views, however ultimately on the key problem of "various dynamic source in the evolution of the earth and the energy conversion mechanism", they all encountered difficulties on the key problem. The degree of the researches is still in the observation and description stage of earth kinematics, and there is still a "qualitative" leap away from the real "geodynamics research".

The discovery of the being-"rolling" mechanism of the energy (momentum) coupling between the sun and the earth

In 1991, Song Guanyi and Yang Tonglin found that the solar radiation (light pressure), the earth's rotation and revolution formed a set of coupling physical mechanism making the earth crust in being-"rolling" state. The "rolling mechanism" structure and principle are exactly the same with those people use "longitudinal rolling" rolling mill structure and principle in metal plastic physical processing. The overall structure of the "rolling mill" is:

- a) "Rolls". Spherical "roll A" and "roll B" are parallel to each other and rotate in opposite direction with each other. "Roll A" is the earth. Its rotation direction is from west to east, and its rotation cycle is a day, "roll B" is the geometric ellipsoid formed by the earth revolution orbit around the sun (although the sphere seems invisible, but it is an entity full of light



quanta); the direction of its rotation is exactly opposite to the rotation direction of the earth, from east to west, and the rotation cycle is one year (tropical year).

- b) "Rolling piece". The "rolled piece" is the surface of the earth, i.e. the crust roughly separated by the Moho surface. The earth crust is located between two "rolls", brought into the "rolling joint" by the earth's rotation, the forward direction is perpendicular to the axis direction of the earth's rotation (along horizontal direction of the earth crust surface). The contact surface of "roll B" and "rolling piece" (earth crust) is seamless "bite" (because the earth surface is uneven and the distribution of land and sea is extremely irregular, this coupling mode cannot be done manually at present).
- c) The power source to maintain the rotation of the "rolling mill". The rotation of "roll A" comes from the rotation of the earth; the rotation of "roll B" comes from the revolution of the earth; the rolling pressure (positive pressure) of "roll B" to "roll A" is the repulsion force (light pressure) generated by the solar radiation on the earth's crust. Since the formation of the earth, this "rolling mill" has existed objectively and never stopped running. It has converted the sun's radiation repulsion (light pressure) to the earth, through this seemingly "invisible" "rolling mill" conversion, naturally, effectively and continuously, into the horizontal stress, which promotes the movement (deformation and displacement) of the crust material [6,7].

The discovery of the "rolling"-type directly-coupling physical mechanism of energy (momentum) between the sun and the earth completely changed the previous concept of people engaging in the geodynamics: first, it broke the past concept i.e. people thought that the rotation of the earth and its revolution around the sun is only itself single movement form; its movement style and evolution law is a relatively isolated natural phenomenon. It reveals that the earth's rotation and its revolution are its natural function elements in order for its own survival and evolution and in order for effective obtaining the radiation energy (momentum) from the sun. The earth's rotation and its revolution, combining with solar radiation (light pressure) repulsion, jointly form a set of system having "rolling" function. The force source of geodynamics is transformed through the combination of various functional elements within this "system". [7]. Second, the solar system is an organic system" (cell) with relatively independent evolution and with "life" characteristics; the earth is just a part of the "organic system", that is, the formation and evolution of the earth is not isolated, self-contained. The entire "life" process of the earth is involved in the formation and evolution of larger solar (stellar) system with relatively independent evolution functions, and is restricted by the overall evolution law of the solar system [8]. Third, the "rolling" of the earth crust will inevitably produce the "rolling exhibition" effect [9]. The ever-changing geological structure (micro and macro) forms of the continental crust surface are the inevitable results of the "rolling exhibition" effect after the crust is "rolled"; Fourth, the "rolling"-type coupled physical mechanism ("system") may be the common energy (momentum) coupled conversion mode between stars and planets in other star systems in the universe.

Evidence of the existence of the physical mechanism of being "rolling" of the earth crust

Evidence of the essential differences between the continental crustal rock dynamics and the oceanic crustal rock dynamics

The continental lithosphere and the ocean lithosphere are the two basic tectonic units that constitute the entire earth lithosphere. The movement, collision and evolution between the two should be an organic and interrelated whole. However, the observations prove that the continental lithosphere and the oceanic lithosphere have their own independent characteristics:

- a) The thickness of the earth crust of the oceanic lithosphere is only a few kilometers, while that of the continental lithosphere is usually more than 35 kilometers. The oceanic shell is thin, but relatively dense. When the ocean lithosphere and the continental lithosphere collide each other, the latter will sink into the mantle in the subduction zone. The density of the continental crust is less, and the giant thick continental crust stays in floating state.
- b) The strength and rheological characteristics of the continental lithosphere and the ocean lithosphere are also obviously different: the strongest part of the ocean lithosphere is located in the mantle (about 20-60 km deep), forming a solid core, the upper part is brittle, the lower part is toughness (or plastic) and the deeper, the more obvious, and then gradually changes

into the asthenosphere. The continental lithosphere is completely different. At the same depth as the strongest part of the ocean lithosphere, the continental lithosphere is the earth crust, not the mantle.

- c) In fact, the ocean lithosphere does not have large mountains formed by orogeny. The topographic features such as midocean ridge and seamount are mainly formed by the invasion of the mantle melt body and volcanism. While the most mountains on the mainland are caused by the orogeny making the earth crust thickening. But in the ocean region, there is no thickening action of the crust. Instead, the two lithosphere plates keep converging and the subduction movement of the entire lithosphere continuously occurs.

According to the theory of the being- "rolling" mechanism, both the continental lithosphere and the oceanic lithosphere are parts of the whole earth's lithosphere. However, because the upper part of the ocean lithosphere is covered by a layer of seawater, the shear modulus (rigid modulus) of the liquid is equal to zero. In a semi-open system, the liquid does not have the ability to transmit the solar radiation pressure; the repulsion action of the sun (light pressure) is consumed (or shielded) by the liquid on the surface of the ocean shell; the ocean lithosphere cannot be "rolled"; the crust "rolling" effect can only be generated on the earth land crust, the area of which accounts for about 30% of the whole global crust surface area. Therefore, the existence of being "rolling" mechanism of the earth crust is the reason for the essential difference between continental crust rock dynamics and oceanic crust rock dynamics.

Evidence of why all the structural deformation of the continental lithosphere almost entirely has rheological property

Almost all structural deformations of the continental lithosphere have rheological property. How this familiar natural phenomenon is formed has been troubling the geological circle. In recent decades, geologists in the world have paid great attention to the rheology of geological structures, which is considered to be the basis for the study of lithosphere dynamics. In terms of the causes of geological tectonic rheology, most earth scientists focus on the fluid action inside the rock layer, believing that the fluid inside the rock layer plays a very huge role in the tectonic deformation. However, after more than half a century of continuous exploration, the progress made in the study of tectonic deformation and its dynamic mechanism is very limited, and even basically in the powerless state [5].

Rolling is a process of plastic deformation under the action of rotating roll. Nowadays, the "rolling" mechanism used in the plastic physical processing of metals is only a few hundred years old. In 1480, Italian Finch Leonado da Vince has designed the "rolling mill" sketch. In fact, the natural "rolling" mechanism existed during the process of the dynamics evolution of the solar system billions of years ago (it was first discovered by Chinese scholars Song Guanyi & Yang Tonglin in [9]). The "rolled piece" in the "rolling mill" is the "continental crust" of the entire surface of the earth, which is "rolled" once a day. Since the formation of the solar system, the continental crust has been rolled at least 1.6×10^{12} times. It is clear that the plastic rheological properties of the rocks in the continental lithosphere are the inevitable results of repeated being "rolling" of the rocks and strata since the long period (geological history). The fluid contained in the rock and rock strata only accelerates the deformation rate under the "rolling" mechanism; and the existence of the "rolling" mechanism of the earth crust provides the kinetic theory support for the precipitation, migration and aggregation of water, oil, gas (including natural gas) resources contained in the rock and rock strata.

Evidence from the power source and energy release control factors (quantitative) of the global seismic (tectonic seismic) activity

The natural earthquake (tectonic earthquake) is one of the manifestations of crustal movement, it is a special form of rapid release of crustal movement energy (force source). According to the seismic records of nearly a hundred years, the global seismic activity mainly occurs in the Pacific seismic belt, the Eurasian seismic belt and the mid-ocean ridge seismic belt. Due to the huge loss of human life and property caused by earthquakes, the research on global distribution of seismic activity and energy release control factors (quantitative) has attracted the high attention of relevant scientists all over the world. "The plate tectonics theory" appearing in 1970s explained the distribution of the global seismic zone (because of the extrusion between earth plates) and the power source of plate tectonic movement coming from interior of the earth (mantle convection hypothesis). The theory was once respected by many scientists from various countries (considered as a revolutionary role in the history of earth science and listed as one of the top ten scientific achievements of the 20th century). However, the biggest failure of "plate tectonics theory" is precisely in the key problem of plate tectonics theory, namely, the "dynamic mechanism of plate tectonics". According to observations of many hotspots around the world, the speed of the mantle movement

is very small and almost stationary. The movement speed of the lithosphere plate can reach more than ten centimeters per year [10]. Obviously, using the “mantle convection hypothesis” as the dynamic source mechanism of plate movement (including the force source of tectonic earthquake) is not valid, and the problem of the dynamic mechanism of plate motion has still not been solved.

The continental scientific deep drilling is an important part of the international lithosphere program, one of the major frontiers of earth science in the 20th century. It is a high scientific technology in the field of geoscience. In 1966, the Federal Republic of Germany drilled the first ultra-deep well (6272.2m) in Western Europe in the sedimentary rock area. From the core survey of the pilot well, the geologists found that there exist the strong horizontal stresses in the very shallow surface, there are still signs of pressure in the depth of 3400m, and the core fragmentation phenomenon appears. This observation has completely changed the perception of traditional geology.

According to the theoretical analysis of the being- “rolling” mechanism, the strong horizontal stress in the shallow surface comes from the conversion of the “rolling” coupled physical mechanism (can be called “system”), which is composed of the repulsion (light pressure) action radiated by the sun, the rotation and revolution of the earth [7]. The discovery of this natural “organic system” is one of the forms of “system theory” in the earth science, which emerged in the 1950s. It marks a new stage in the development of human cognition, that is, from the internal organic connection of objects, from the external connection of an object with another one, look at the objective material world dialectically and systematically. This change in understanding is essentially a fundamental change in the way of thinking in the study of geodynamics.

Another objective evidence of being- “rolling” mechanism (“system”) of the earth crust is the discovery of quantitative control factors for global seismic energy release. According to the theoretical analysis of the mechanism of being- “rolling” of the crust, the being- “rolling” of the crust surface is carried out from west to east along the direction parallel to the latitude belt. The crust in each latitude belt is like a “rolled belt”, and this “rolled belt” is “rolled” once a day. Because the “rolling exhibition” effect can only occur on the crust surface in the “rolling strip”, and the crust surface in the “rolling strip” is relatively fixed, thus it can be inferred: the land surface area of each latitude zone on the earth crust should be the quantitative index to control the energy release of earthquakes [9]. The above inference is confirmed by the energy release data of the global strong earthquakes from 1901 to 1985 (the energy released by the global strong earthquake ($M_s \geq 7.0$) accounts for more than 90% of the global seismic energy

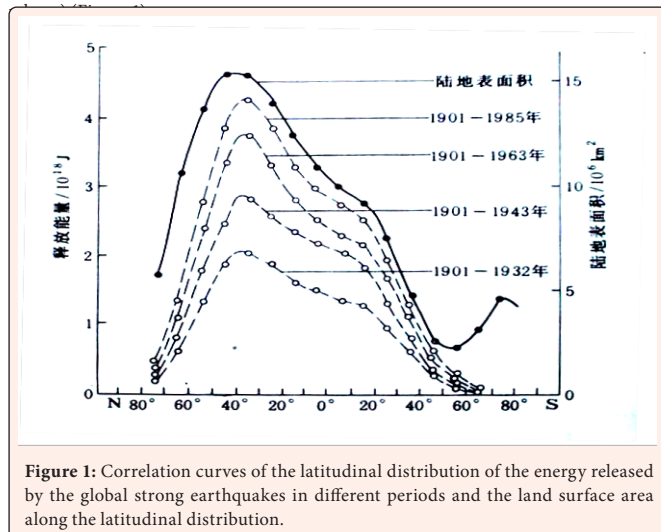


Figure 1: Correlation curves of the latitudinal distribution of the energy released by the global strong earthquakes in different periods and the land surface area along the latitudinal distribution.

[According to Song Guanyi [9]] The solid line in Figure 1 is the geographical distribution curve (smoothing) of land surface area in each latitudinal zone; the dotted line is the geographical distribution curve (smoothing) of global strong earthquake ($M_s \geq 7.0$) activity energy released in different periods. It can be seen that in the range from north latitude 60° to south latitude 60° the distribution curve of land surface area along the latitude is strongly correlated with the global strong earthquake energy release curve during the time from 1901 to 1985 (in Antarctica area the unrelated reason is the rapid decline of the crustal “rolling spread” effect along with the increase of latitude) [11-21].

The revelation of the quantitative control factors of the energy release of global strong earthquakes ($M_s \geq 7.0$) is an inferential result achieved after the discovery of the “rolling” mechanism (“system”). Before the discovery of this “system”, no researchers (including Song Guanyi and Yang Tonglin himself) realized that the amount of energy released by the strong seismic activities in the global latitude zones is restricted by the size of the inland surface area in the latitude zone; nor would they further realize that the energy source (force source), that causes earthquakes, is not from the interior of the earth, but from the (solar pressure) repulsion action.

The Origin Association Between the Repulsion Interaction and the Universe Accelerated Expansion

The discovery of the universe expansion

In 1929, American astronomer E.P. Hubble found that the spectrums of galaxies generally have redshift phenomena, indicating that many galaxies are leaving us (called “retrogression”). Hubble calculates the retrogression velocity of the 24 galaxies with known distances, and obtains a simple formula:

$$V=HD$$

Here V is the retrogression velocity of the galaxy, D is the distance of the galaxy relative to us (the Milky Way), and H is a proportional constant. Later, people called this formula as Hubble’s law and H the Hubble constant. Hubble’s discovery proves that the universe is expanding. Since then, the astrophysics community has believed that the universe is expanding at a constant speed, and the expanding universe model has become a recognized kinematic cosmological model. After learning of Hubble’s discovery, Einstein abandoned his static universe model, and also abandoned the cosmic terms in the gravitational field equation.

Until 1998, S. Perlmutter of the Berkeley Branch Campus, University of California, American / Australian physicist Brian, B. P. Schmidt and American scientist A. G. Riess announced that the expansion rate of the universe is not constant, and more, is not slower and slower, but constantly accelerating, faster and faster. Here, it is a shocking discovery. This result has directly shaken the entire astrophysics community (They won the Nobel Prize in Physics in 2011). According to Newton’s law of gravitation, the impulsive force generated by the Big Bang under the action and containing of gravity, the retreat speed of galactic bodies should gradually slow down until the balance is stabilized, however the discovery of these three scientists is contradictory with Newton’s law of gravitation. How to solve and interpret the contradiction between the two? Physicists believe that there is only one possibility, that is, there is a mysterious force in the universe that is in the opposite direction of gravity (anti-gravitational force) and the force has not yet been discovered! The physics community calls this unknown and mysterious force in the opposite direction of gravity as “dark energy”. And just this “dark energy” drives the accelerated expansion of celestial bodies.

The magnitude of the energy that drives the expansion of the universe

How many galaxies are there in the universe and how many stars are there in the universe? Astronomers are still studying and exploring. The sun, in the system of which we human being inhabit, is a very humble star in the Milky Way galaxy, which contains about 100 to 400 billion stars. Astronomers have had different estimates of the number of stars in the universe, and one of the theories is proposed by American astronomer Carl. E. Sagan. In his book “One hundred billion in one hundred billion”, he suggests that there are 100 billion galaxies in the universe, and each galaxy has 100 billion stars. And some scientists estimate that the total number of stars in the universe may be three times of our current estimate, up to 1023 stars, more than total number of sand grains in all the beaches and deserts on the earth. If the energy released by each star is based on the energy emitted by the sun into space per second (3.82×10^{26} J), it is preliminarily calculated that all stars in the universe can emit energy on the order of 1.0×10^{49} J per second. If the average lifetime of all stars in the universe has reached 5 billion years, all stars could radiate the energy to the whole universe space at least on the order of 1.0×10^{66} J. This energy acts on the whole material world in the way of repulsion interaction. No matter the magnitude, the speed of propagation and the range of distribution, it is the unique power source driving the expansion of the whole material world.



The power source driving the expansion of the universe

Stars are luminous bodies in the universe that can heat and glow with the energy generated by nuclear fusion. The energy emitted by each star in the universe can form a independent repulsion field (or energy field) centered on the main body of the star. The existence of the repulsion field will push the objects (planets and interstellar matter) in the universe space occupied by the star away from the main body of the star, causing the astro space occupied by each star to constantly expand. Stars are the most basic members of the universe, and all the stars in the universe are continuing to shine, which will inevitably lead to the continuous expansion of the whole universe. From this point of view, the power source that drives the expansion of the universe is the thermonuclear reaction from all the stars in the universe, and the energy radiated by each star is the fundamental cause of the expansion of the whole universe.

The reasons for the accelerated expansion of the universe

- The expansion of a single star means that objects (planets and interstellar matter) in a single stellar system are driven away from the center of the star by repulsion interactions, and its expansion speed is controlled by the amount of energy radiated out inside the star
- The expansion velocity between two adjacent stars is a superposition of the expansion velocity of these two stars.
- The expansion velocity between any two distant stars(galaxies) in the universe is determined by the number of stars existing between the two stars (galaxies). The expansion velocity of one star (or galaxy) at the center of the observation point relative to the other star (or galaxy) is the superposition of self-expansion velocities of both stars existing between the two stars (or galaxies). Obviously, the more stars existing between two stars (galaxies) (i.e. the farther the distance between them), the faster the star (or galaxy) expands relative to the other star (or galaxy) from the center of the observation point.
- When the number of stars(galaxies) presenting between two stars (galaxies) reaches a certain number (such as hundreds of billions or even thousands of billions), the expansion velocity between two stars (or galaxies) will inevitably exceed the speed of light (300,000 km /s). That is why the light radiated by some stars can never reach the earth (the solar system).

The Energy Radiated by All Stars in the Universe is Most Likely the “Dark Energy” that the Physics and Astronomy Circles are Concerned About

(Solar pressure) Repulsive interactions push the matters (planets and interstellar matters) in the solar system away from the sun, making the space occupied by the solar system (star) to expand. Scientists deduced through sky observation that in the observable universe the total number of similar Galactic galaxies is at least 2 trillion or more. In each galaxy there are about hundreds of billions of stars. The energy emitted by each star in the universe (the energy carried by light quanta) is like a inflatable balloon that causes the matters in space to expand in all directions (swelling). This expansion is different from what we usually understand, because the universe does not have a clear center, and every object in space is moving away from each other, causing the entire universe to accelerate the expansion. To sum up, it can be inferred that the existence of repulsion interaction provides necessary and sufficient conditions for the accelerated expansion of the entire universe, and the energy radiated by all stars in the universe is most likely the “dark energy” that the physics and astronomy circles are concerned about.

Thanks: In the process of writing this article, the author received help and support from geophysicist professor Chen Tiehua. The author expresses his heartfelt thanks.

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