



## PARADIGM IN THE THEORY OF ROTATION AND REVOLUTION FROM A PHYSICIAN VIEW

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### Abstract

*The Earth's rotation and revolution are two important movements that affect life on the planet, according to science. The acceleration of gravity at the Earth's surface is influenced by the Earth's rotation due to its non-perfect spherical shape. Because of the Earth's rotation, it tends to bulge at the equator and flatter at the poles. This causes the distance from the poles to the center of the Earth to be shorter than that at the equator. This research employs a literature study approach, utilizing a qualitative descriptive method with an interpretative approach, which involves interpreting the verses of the Quran related to the theme or title of the discussion. The data used in this research is obtained from reading materials, including Tafsir books, other books, journals, and other relevant sources related to the title of this research. The Earth's rotation causes the apparent daily motion of celestial bodies, as well as the alternation of day and night. The direction of this rotation has a variety of effects on the Earth's rotation that can result in day and night. Meanwhile, the Earth's revolution causes seasonal changes because it is tilted on its axis. During its revolution, the Earth's position changed, resulting in seasonal variations in different parts of the world. The Earth's rotation refers to its spin on its axis. The Earth's rotation period is the time it takes for the Earth to complete one full spin on its axis, which is 23 hours and 56 minutes. Meanwhile, the Earth's revolution refers to its orbit around the sun. The Earth's revolution period is the time it takes for the Earth to complete one full orbit around the sun, which is 365 and a quarter days or one year.*

**Keywords:** Rotation, Revolution, Physics, Tauhid.

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### INTRODUCTION

The Earth's rotation and revolution are two important movements that affect life on this planet, according to science. Due to its imperfectly spherical shape, the Earth's rotation influences the acceleration of gravity at its surface. As a result of this rotation, the Earth tends to bulge at the equator and flatten at the poles. The rapid advancement of time certainly makes it easier for humans to learn new things that pique their curiosity. The development of science and technology is closely related to the content found in the Qur'an. However, misunderstandings often occur in the interpretation of verses from the Qur'an, leading to differences of opinion among people. Consider the concept of whether the earth is round or flat (Putra & Hibatullah, 2022). The universe encourages humans to think about its creation based on local cultural values, language, religion, and history. A traditional mindset leads people to pay attention to civilization in order to create a universal order in the global world, aimed at fostering the development of technology and science without excluding cultural values and equality (Amriana et al., 2024).

It's shorter from the poles to the center of Earth than at the equator. As a result, gravitational acceleration is greater at the poles, while it is slightly lower at the equator

due to the centrifugal effect of rotation opposing gravitational force. The Earth rotates on its axis, a process that lasts for 23 hours and 56 minutes. This movement causes day and night to alternate and affects the time in various locations on Earth.

Marlina & Ajna (2024) The Earth's revolution is the movement of the Earth around the Sun, which takes about 365  $\frac{1}{4}$  days. This revolution causes seasonal changes and variations in the length of day and night throughout the year. These two movements are interconnected and are crucial for understanding the natural phenomena that occur on Earth. The Earth's movement around the sun, like other bodies in the solar system, is captured by the sun's gravitational pull. This attraction is what causes the Earth to rotate on its axis while orbiting the sun, and in this regard, it takes a year to complete each revolution (Yusuf, 2021). The Earth's rotation is the movement around its own axis, from west to east. If we observe from a spacecraft directly above the North Pole, the Earth rotates counterclockwise. Meanwhile, the Earth's revolution refers to its movement in orbit around the sun. The ecliptic is the path of Earth's orbit around the sun. While orbiting the sun, the Earth's axis is always tilted at 23.5 degrees relative to the perpendicular line. The Earth revolves in a negative direction (counterclockwise), meaning that if we were in a spacecraft directly above the North Pole, we would see the Earth orbiting the Sun in the opposite direction of the clock's hands.

Parisia et al. (2023) One of the hadiths that mentions the earth's rotation and revolution is from Abu Dzar al-Ghifari, who said, "I heard the Messenger of Allah (peace be upon him) say, 'Indeed, the sun moves in a specific orbit, and when it reaches its time of setting, it is beneath the Throne of Allah.'" It then prays, and Allah allows it to do so. Then Allah says, "Return to your original place." The sun continues to move until it reaches a different time of sunset. "This is the will of Allah, the Almighty and All-Wise." (HR. Bukhari Muslim) This hadith describes the sun's movement in its orbit and the act of praying to Allah at sunset, after which Allah commands the sun to return. This demonstrates that the Earth revolves around the sun, not the other way around. In relation to the earth's revolution, verse 2 of Surah Yaasin states: "We have made a beautiful cluster of stars in the sky to adorn the view for those who look at it." (QS. Yaasin: 2). This sentence implies that the Earth is part of a solar system consisting of planets and stars. As a result, the Earth must revolve around the sun to maintain the balance of the solar system. However, as previously stated, the Quran does not explicitly mention the Earth's revolution in physics. In conclusion, the Quran does not explicitly discuss the rotation and revolution of the Earth in physics, but there are several verses that indirectly address this concept. As a result, we must study physics separately to fully understand the Earth's rotation and revolution. The understanding of monotheism has significant implications for the behavior and ethics of Muslims. The belief that God is All-Knowing and All-Just encourages Muslims to live with high morality, honesty, fairness, and to treat others well. Belief in Allah, the only true strength, provides peace and mental fortitude. Tawaf teaches that Allah controls everything in the world, and Muslims can only seek His help and strength from Him. The importance of monotheism in Islam is not only theoretical but also plays a central role in shaping the identity, worldview, and behavior of Muslims (Tanjung, 2023).

## **METHODS**

This research employs a library research approach, utilizing a qualitative descriptive method with an interpretative approach, which involves interpreting verses of the Qur'an related to the theme or title of the discussion. The data used in this study is obtained from reading materials, including tafsir books, other books, journals, and other relevant sources related to the title of this research. According to Mestika Zed in his book

"Library Research Methodology," library research is a series of activities related to collecting library data, reading, taking notes, and processing research materials.

## RESULTS AND DISCUSSION

The Earth's movement refers to its rotation around its axis, which ends at the North and South Poles. The Earth's movement on its axis begins from west to east over a period of 24 hours, as observed from the east to the west, including the sun, moon, and stars. As the Earth rotates, the daily movement can be seen on its axis from west to east, specifically with the sun.

Natural phenomena have taught humanity that in achieving a common goal, there must be teamwork within a system, where each part, with its heterogeneity, performs the same or different tasks in relation to one another (Abdullah & Sunarno, 2013). These formulas include the Earth's rotation period, which is the time it takes for the Earth to rotate one full revolution on its axis. The Earth's rotation period is expressed in units of time, typically hours, minutes, or seconds. The formula is:

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$$T = 24H / \text{Rotation} \quad (1)$$

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The cycle of day and night, besides marking time, also plays a crucial role in sustaining life on Earth. With the presence of day and night, society can alternate between working and resting, as well as utilize the day for activities and the night for rest. Time is assumed to follow the Quran's holy verses, where day and night always change due to the Earth's rotation or spin on its axis. Therefore, the formula for calculating the Earth's rotation period ( $T = 24 \text{ hours} / \text{rotation speed}$ ) helps to determine the time required for the Earth to complete one full rotation on its axis, which is also referred to as the Earth's rotation time. You can quickly calculate the time needed for the Earth to complete one full turn using this formula. It is important to understand natural phenomena such as the alternation of day and night, which is explained in verse 33 of Surah Al-Anbiya about the change of day and night. The Earth's rotation causes the apparent daily motion of celestial bodies, as well as the alternation of day and night. The Earth's rotation has a single direction: it spins clockwise. This direction of rotation creates various effects of the Earth's spin that result in the occurrence of day and night, although the length of night and day varies from one place to another. The rotation or spinning of the Earth is slowed down by the gravity of the Moon. The slowing of the Moon's gravitational motion can be observed in the deceleration of one day by 1.7 milliseconds compared to a century ago (Valenza, 2021). The Earth's revolution causes seasonal changes because it is tilted on its axis. During its revolution, the Earth's position changed, resulting in seasonal variations in different parts of the world. The positions of stars in the sky will appear different at various times and places around the globe. The Earth's revolution also influences climate change, as changes in the Earth's position lead to variations in the amount of sunlight received by different regions at different times. The same applies to larger objects than Earth. Just as electrons orbit around an atom's nucleus, the Earth rotates and revolves around the sun. Then, each sun is surrounded by a number of planets, including Earth, which also orbits the galaxy's center. The galaxy we live in is called the Milky Way. The center is surrounded by about 100 billion suns and hundreds of billions of planets. Galaxies appear to rotate around the center of the supercluster. A supercluster is a collection of galaxies with around 100 billion suns and trillions of planets. Everything revolves around the central point. All of the natural turning points mentioned above have an extraordinary order that can only be arranged and adjusted by Allah SWT (Kuno, n.d.).

In the physics learning material regarding the Earth's revolution, there are important formulas related to the Earth's revolution, one of which is the period of the Earth's revolution, which is the time required for the Earth to complete one full rotation around the Sun. The Earth's revolution period is expressed in units of time, usually in years or months. The formula is as follows:  $T = 2\pi r / v$  Where:  $T$  = Period of the Earth's revolution in units of time, namely years or months.  $r$  = the radius of the Earth's orbit in meters of distance.  $v$  = the Earth's orbital speed in units of distance per time, namely meters per second. The Qur'an is believed by Muslims to be the absolute or true word of God, applicable throughout time, containing teachings and guidance on various matters related to life in this world and the hereafter. The teachings and guidance of the Qur'an are related to various concepts that humans need to navigate their lives in this world and in the hereafter (Azis, 2018). The Quran does not ask everyone who reads it to pay attention to natural phenomena, except in two cases: the alternation between day and night and during the night itself. These two phenomena are routinely encountered by everyone. As a result, these phenomena often pass by without leaving a lasting impression or prompting any contemplation behind them. This is what will happen if we do not comprehend and pay attention to how the explanations and understandings are presented in the Quran. The Qur'an provides evidence about the universe, including the solar system, the Earth and moon's revolutions, and the occurrence of lunar and solar eclipses (QS. Yaasiin, verses 37-40). "And the sun walks in its orbit." This is the decree of the Almighty and All-Knowing. We have established the phases for each month, ensuring that the final phase is reached. He returned as part of an old bunch. It is not possible for the sun to catch the moon, nor can night precede day. And each of them orbits along its own orbital path." (QS. YaaSiin : 38-40).

In Surah Al-Luqman, there is a verse that explains how humans reflect on the greatness of Allah SWT through His creations that are closest to them, namely the rotation of night and day. Allah rotates or makes night and day turn with His absolute power; in this case, Allah also shows His extraordinary greatness over all His creations. This surah contains very valuable lessons for human life, including how to live correctly and in obedience to Allah SWT. There is no direct connection between Surah Al-Luqman and the Earth's revolution. However, in general, the Quran illustrates Allah's immense power over the universe and the importance for humans to think about and appreciate the beauty and greatness of His creations. In Surah Al-Luqman, there is a verse that depicts the greatness of Allah and the beauty of His creations, which can help humans understand the importance of reflecting on the revolution of the earth and other natural phenomena: "And among His signs is the creation of the heavens and the earth, as well as the diversity of your languages and your colors." Indeed, that is a sign for those of knowledge." (QS. Luqman: 22). Allah SWT explains that among the evidence of His great power is the creation of night and day is evidence of His great power. Allah SWT created the night with darkness and the day with light. They take turns; when one arrives, the other departs. When the other leaves, the one comes (Jumadi et al., 2022). According to the statement above, it can be concluded that Allah SWT revealed the Qur'an to serve as a law or regulation and a guide for humanity. The Qur'an is a source of Islamic teachings that encompasses various aspects of knowledge. The Qur'an encompasses teachings on monotheism, the promises and threats of Allah SWT, worship, the paths and methods to achieve happiness in life, and the stories of the Prophet's followers prior to Prophet Muhammad SAW. Thus, by adhering to the Qur'an, an educator can effectively transfer knowledge, especially in studying physics regarding the movement of the earth as mentioned in QS. Az-Zummar verse 5. "He created the heavens and the earth with a purpose that is true; He wraps the night over the day and wraps the day over the night, and He has subjected the sun and the moon, each running for an appointed time. Remember, He is the Almighty, the Most Forgiving." (QS. Az-Zummar: 5).

This verse implies that the earth is spherical and rotates on its axis due to the continuous alternation of night and day. That was what the Soviet astronauts and Yuri Gagarin later witnessed when they orbited the Earth for the first time in 1961. The Earth, which is spherical in shape, also experiences a rapid and continuous alternation of light and darkness, according to Ch-al-Cois. When orbiting the sun, the Earth also rotates on its own axis or orbital line, completing one rotation per day (24 hours). This rotation gives rise to the phenomena of day and night. Because our Earth rotates on its axis from west to east, we who are on Earth see the sun moving from east to west. Every morning, the sun rises on the eastern horizon and sets on the western horizon. This research aligns the material on Earth movement in Tauhid Physics with the Qur'an, specifically verse 5 of QS. Az-Zummar. However, the Qur'an, which Muslims recognize and believe to be a guide and source of life, does not form the basis of its application or the material presented in books or media used for education. The Qur'an validates Tauhid Physics' Earth movement material, which can be continued from a scientist's perspective. This is because the research has proven the validity of the scientists' opinions through the guidance of the Muslim community.

## CONCLUSION

The movement of the Earth, according to science, consists of the Earth's rotation and revolution. The rotation of the Earth is the spinning of the Earth on its axis. The period of Earth's rotation is the time it takes for the Earth to complete one whole spin on its axis, which is 23 hours and 56 minutes. Meanwhile, the revolution of the Earth is the movement of the Earth around the sun. The period of Earth's revolution is when it takes to complete one full orbit around the sun, which is 365 and 1/4 days or one year.

The movement of the Earth consists of its rotation and revolution, where rotation refers to the Earth's motion on its axis. In contrast, revolution refers to the Earth's motion around the sun. As a result of the Earth's rotation and revolution, there are differences between day and night, time variations, and seasons, such as summer, spring, winter, and autumn. The movement of the Earth in the subject of Tauhid Physics is in line with the Qur'an or is validated by the Qur'an, particularly in this study, QS—az-Zummar verse 5. However, in its application and the materials presented in the books or media used for education, it is not based on the Qur'an, recognized and believed to be a guide and source of life for Muslims. Nevertheless, the truth of the Tauhid Physics material regarding the movement of the Earth has been confirmed by the Qur'an and from one perspective, namely the perspective of scientists, because in this study, the truth of the scientists' opinions has been proven with the guiding sources of the Muslim community.

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