Novelty Journals

ISSN 2394-9651

International Journal of Novel Research in Physics Chemistry & Mathematics
Vol. 11, Issue 3, pp: (10-14), Month: September - December 2024, Available at: www.noveltyjournals.com

Oil And Natural Gas Production from Earth's Core Cause Change in Its Mass and Angular Momentum

Dr. Ziadan Jassim Khalaf

Asst. prof. of physical chemistry

Chem. Dept. Swansea. University of Wales (U. K) 1990

DOI: https://doi.org/10.5281/zenodo.13898420

Published Date: 07-October-2024

Abstract: **The production of oil and natural gas from the earth core as a fuel to produce energy cause reduce in earth's mass that lead to change in some physical quantities, the speed of rotation around itself (around its axis) also around the sun.**

The angular momentum of the earth according to previous studies (literature review) will compare with that calculated in this study as it given in the table-1 which Show the earth's mass (M_e), oil mass (M_o) and natural gas mass (M_g), and table-2, Which show the angular momentum for earth (L_e) change in angular momentum due to change in earth's mass (ΔM_e) and the difference between earth's angular momentum and that after lost mass due to oil and natural gas mass.

Keywords: **Earth's mass, oil mass, natural gas mass and earth's angular momentum.**

1. INTRODUCTION

1. Mass of earth.

Earth's mass (M_e) as it found using dynamic finding.

The mass of earth according to formula

$M_e = gd^2 / G$ … (1)

Where:

G- gravitational force constant. d- distance between two objects. g- gravity acceleration.

The values of earth's mass were calculated according to above parameters and earth's mass (M_e), As it is found in the review

d- $(6.376 \times 10^6 - 6.38 \times 10^6)$ m

G- $(6.66 \times 10^{-11} - 6.67 \times 10^{-11})$ m^3 $Kg.^{-1}$ s^{-1}

g- 9.8 N/Kg. The earth's mass (M_e) values' M_e is 5.9722×10^{24} Kg,

5.973×10^{24} Kg

At $(d = 6.378 \times 10^6$ m)

And

$M_e = 5.980 \times 10^{24}$ Kg at $(d = 6.638 \times 10^6$ m)

According to (eq.1) [1]

Novelty Journals

ISSN 2394-9651

International Journal of Novel Research in Physics Chemistry & Mathematics
Vol. 11, Issue 3, pp: (10-14), Month: September - December 2024, Available at: www.noveltyjournals.com

2. Speed of the Earth Rotation.

Speed rotation of the earth about 1,000 miles/hr, how fast is the earth spinning around the Sun, earth's orbits around the sun as speed of about 67,000 miles/hr (107,000 Km/hr or nearly 30 km/s) At the same time. earth spins on its axis at about 1,000 miles/hr (460 m/s or 1,600 km/hr). [2]

3. Oil and Natural Gas Production in the World. [3]

3.1 World oil that produces a day in 2023

Is 81,804,000 barrel/day and for 1 year (366 day) is 29,940,000 barrel/year.

For last 50 year

$50 \times 29{,}940{,}264{,}000 = 1.497 \times 10^{12}$ barrels/year.

Each barrel = 131,27 Kg

So, the total is

$M_o = 1.497 \times 10^{12} \times 131.2 \text{ Kg} = 1.965 \times 10^{14}$ Kg

3.2 Global natural gas (M_g). [4]

Natural gas production amounted to some 4.08 trillion cubic meters in 2023, Signifying slight decrease compare to previous years.

1 trillion = 1×10^{12}

So, $4.08 \times 10^{12} = 4.08 \times 10^{12}$ cubic meters (m^3).

For 1 m^3 = 2.352 Kg.

Therefore, $Mo = 4.08 \times 10^{12} \times 2.352$ Kg $= 9.596 \times 10^{12}$ Kg.

3.3 Total mass (Mt) of oil and natural gas is equal to.

$Mt = M_0 + M_g = 1.695 \times 10^{14} + 9.943 \times 10^{12} = 2.064 \times 10^{14}$ Kg And , $\Delta M = M_e - M_t + = 5.979 \times 10^{24} - 2.064 \times 10^{14} = 5.9789 \times 10^{24}$ Kg. (table-1).

4. The Angular Momentum.

v /Vector that quantifies circular rotation **m** of a particle about on axis is defined as a momentum of the linear momentum.

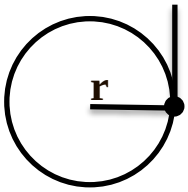

fig.1 Angular momentum of particle.

$L = I.\ \omega = r \times p$ . . . (2)

I. e, the vector produce of the liner momentum and the radius from the point of rotation, ($I = m.r^2$, $\omega = v/r$, r - radius). [5]

4.1 The moment (p), is a product of the mass of particle (m) and its velocity (v).

$P = m.\ v$ . . . (3)

$L = r\ m\ v$ . . . (4)

Take the time derivative:

$$\frac{dL}{dt} = \frac{(dr)}{dt} \times p + r\left(\frac{dp}{dt}\right) \quad \ldots (5)$$

Novelty Journals

ISSN 2394-9651

International Journal of Novel Research in Physics Chemistry & Mathematics
Vol. 11, Issue 3, pp: (10-14), Month: September - December 2024, Available at: www.noveltyjournals.com

Plug in the definition of velocity. (6-7)

$$: \left(\frac{dr}{dt}\right)\left(\frac{dL}{dt}\right) = v \times p + r\left(\frac{dp}{dt}\right) \quad \ldots (6)$$

4.2 The law of conservation of angular momentum, (L).

Applied to planets orbiting the Sun, the closer a planet is to the sun the grater its velocity, this holds true even if travel an elliptical orbit, As the distance of the object increases that is, as the planet, move further away from sun, its velocity decreases about as it is move closer, its velocity increases, however angular movement remain constant. (8)

4.3 Angular momentum and its conservation

for solid sphere about any diameter is. (9)

$$I = 2 M R^2 \quad \ldots (7)$$

$$I = \frac{2 M R^2}{5} \quad \ldots (8)$$

$$L = I \omega = \frac{2 M R^2 \omega}{5} \quad \ldots (9)$$

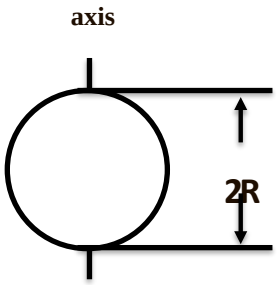

Fig-2

solid sphere about any diameter

4.4 Angular momentum of earth is mass (M_e), calculated by eq-9

Earth's mass (M_e) = 5.979×10^{24} Kg

Radius, R = 6.376×10^6 m

The earth's angular velocity, ω of each exactly one revolution per day = radian per sec.

$L_e = 0.4\ (5.979 \times 10^{24}\ \text{Kg})\ (6.376 \times 10^6\ \text{m})^2\ (1\ \text{rev/day})$

$= 9.72 \times 10^{37}\ \text{Kg. m}^2\text{. rev/d}$

Substituting, 2π rad for 1 rev and 8.64×10^4 sec, for 1 day.

$$L_e = (9.72 \times 10^{37}\ \text{Kg. m}^2) \times \left(\frac{2\pi\ \text{rad/rev}}{8.64 \times 10^4}\right) \times (1\text{rev/d})$$

$$L_e = (9.72 \times 10^{37}\ \text{Kg. m}^2) \times \left(\frac{6.282}{8.64 \times 10^4}\right)$$

$= 9.72 \times 10^{37}\ \text{Kg. m}^2 \times 0.727 \times 10^{-4}$

$= 7.068 \times 10^{33}$ Kg. m2/s. (10)

Novelty Journals

ISSN 2394-9651

International Journal of Novel Research in Physics Chemistry & Mathematics
Vol. 11, Issue 3, pp: (10-14), Month: September - December 2024, Available at: www.noveltyjournals.com

Angular momentum (L_e) for ΔMe calculated according to eq-9

$$L, \Delta M = 0.4\ (5.978 \times 10^{24}\ Kg)\ (6.376 \times 10^{6})^2\ (1rev/d) \times \frac{6.282 \times 10^{-4}}{8.64}$$

$$= 7.067 \times 10^{33}\ Kg.\ m^2/s$$

Also for

$M_e = 5.972 \times 10^{24}$, $Le = 7.0601 \times 10^{33}\ Kg.m^2/s$

And

$L, \Delta M = 7.05998\ Kg.\ m^2/s$, $\Delta L = 0.00012\ Kg.\ m^2/s$

4.5 Angular speed and time period. [11-13]

Angular speed and time period are related to each other through the formula.

Angular speed (ω) = 2π / Time period . . . (10)

Where ω - angular momentum is measured in radian per/second (rad/s).
2π - is constant one complete revolution in radians (2 × 3.141).

Angular speed invers ly proportional with time period.

Angular speed measures how fast the central angle.

A rotating body changes with respect to time.

So,

$$\text{Angular speed, } \omega = \frac{2\pi}{T} = 2\pi f \quad \ldots (11)$$

$(\frac{1}{T} = f)$, f – frequency.

The law of conservation of angular momentum States that the angular momentum is conserved when there is zero not torque applied to a system where the system object or objects that a rotating.

Torque and angular momentum are related through. angular impulse equation. Zero Torque, $\tau = 0 = \frac{\Delta L}{}$

So, $\Delta L = 0\ \Delta t$ and $L_f - L_i = 0 \times \Delta t$

$\Delta t\ L_f = L_i$ (Newton's third law), where i-initial and f-final.

2. RESULTS

Abbreviation.

M_e – earth's mass

M_o - oil mass

M_g - natural gas mass

L_e - earths angular momentum

Table 1: show mass values, M_e, M_o, and M_g and ΔM_e ($M_e - M_t$ ($M_o + M_g$)).

No.Calc.T *	Me (Kg)	Mo (Kg)	Mg (Kg)	Mt (M0+Mg) (Kg)	ΔMc (Kg)
1	$5.979x10^{24}$	$1.965x10^{14}$	$9.943x10^{12}$	$2.064x10^{14}$	$5.9789x10^{24}$
2	$5.972x10^{24}$	$1.965x10^{14}$	$9.943x10^{12}$	$2.064x10^{14}$	$5.9719x10^{24}$

Table 2: show earth's angular momentum (L_e), L, ΔM and ΔL (L_e – L, ΔM)

No.Calc.T *	Le (Kg.m2/s)	L ΔM (Kg.m2/s)	Δ L (Kg.m2/s)
1	7.068×10^{33}	7.067×10^{33}	0.0010×10^{33}
2	7.0601×10^{33}	7.05978×10^{33}	0.12^{33}

*. Number of calculation time.

3. CONCLUSION

The earth's mass change due to lost Oil mass and natural gas mass causing physical quantities altering such as earth's angular momentum. Angular momentum (L) as a property of moving body that determines the length of time required to bring it to rest when under the action of the constant force gained by motion or by a series of evens.

The angular momentum (L) change directly proportional to change in the earth's mass (ΔM_e) according to eq-1 and eq-11

$(L \propto \frac{1}{T})$ So,

T ΔM_e, L_e and T are Synchronized change to each other.

The conservation of earth's angular momentum which Should be zero net Torque, $\Delta L = 0$, assuming no change in earth's mass ($\Delta M_e = 0$).

Because there is a change in earth's mass (ΔM_e), $\Delta L \neq 0$

So that to achieve $\Delta L = 0$, that may be due to one of the phenomena occur. As climate change, Hurricanes and Storms continuously change with the time.

REFERENCES

[1] Xavier Calmet, Stephan D.H and Hur, Manco sebastianutti (2013) Quantum black Holes, p 93. W.M. Hynes, David R. Lide and Thomas J. Bruno (1973) Ed 97th CRC Handbook of chemistry and physics. Sec. (14-11). Angu Rock Research - you Tube by Graham best. (2012). Nasa (gov-) 2024... earth.... https://wssdc-gsf.nasa gov.

[2] Earth... Lesson https:// study.com

[3] L... <wiki <https://en.wikipedia.org (2023), Total world oil production. 2023.

[4] Statistics.. <https://www.statista.com. Global natural gas production. 2023.

[5] De Gruyter, pdf... <https://www.de gruyter.com

[6] Walter J. Moore (1983). Basic physical chemistry, prentic / Hall international.Inc,p(465-466)· Peter ATKIN's, Julio de Paula and James Keeler. (2023). ATKIN's physical chemistry Ed. 12th Science <https://www.britannica.com

[7] What ... chttps://www.quora.com. The momentum of inertia –

[8] what is <https://www.teachtarget.com. Definition Conservation of angular momentum Robert Sheldon

[9] physic... netlearnning.com, calculating angular momentum of earthpicture.

[10] physlibetext, skyline -- .https://phys. l'librettext.org earth angular momentum-picture-

[11] What https://www.quora.com. What is the relation between angular speed and time period.

[12] Angu physics - https://byju's.com, Definition formula, angular speed of earth-pictures

[13] Law... academy... <https://study.com.Conservation of angular momentum | law equation-picture.