

Making Mars as Habitable Planet by Engineering way

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Abstract:- Millions year ago, Mars used to look like Earth. Mars had prominent features to sustain life. The Planet had vast sea with oxygen rich skies and all conditions to support life. Meanwhile Earth was beginning to show that it can support life where Mars was losing its habitableness. The planet could not deflect the solar winds. The magnetic field of Mars vanished so it could not deflect the solar winds consequences to which habitableness of mars is blown away from the solar system. The problem lies with us that could we make mars habitable again. The long term discussions have been stated that if we could place a big magnetic dipole between mars and the sun so that it can deflect the solar winds from the sun. This would make mars 4°C warmer enough to melt the carbon dioxide in the polar cap. The carbon in the atmosphere would trap heat creating a greenhouse effect. This would bring back mar's habitableness. Further with the concept of LDR (Light Dependent register) and UV rays which can also help in bringing back mars habitable. The LDR and UV rays charge the inner solid iron core of mars which create magnetic field inside the core.

Keywords:- Habitable, Magnetic field, Sun, Mars.

I. INTRODUCTION

The last one decade we have seen a lot of development and research about habitableness of mankind apart from Earth. Scientists try to overcome the limitation of prevailing condition in mars. Major components to survive on earth are Oxygen, Gravity, Magnetic field, Water. All these four basic components must require on MARS to make it habitable once again. Life on earth becoming day by day more vulnerable and endanger for human as well as species etc.

As Mars used to look similar like earth and has resemblance attributes of it. With many developments and advancement of space technology the main purpose of mankind to find an alternative home that can support human life¹. As Mars was habitable, it is possible to terra form it and it can be alternative home for humankind³. The terraforming of mars refers to make like a habitable planet that can sustain human life. Terraforming also refers to engineering the constituents and changing the hydrosphere, temperature and addition or expansion of planet biosphere^{2,3}. CO₂ in the atmosphere can increase the average temperature of earth by trapping heat. The environment of earth gets altered. So this terraforming and that's how we can change the atmosphere of Mars². The terraforming of mars includes three primary tasks: increasing the temperature, building the atmosphere and implanting the biosphere⁴. The major advantages of terraforming are

Breathable atmosphere at suitable pressure, Liquid water, and proper amount of oxygen to sustain human life. Proper temperature, proper biosphere with proper amount of food⁵.

Before 4.2 billion years ago, Mars lost its habitableness due to its lost magnetic field that deflected the solar winds from sun⁶. Now the question is that how Mars lost its magnetic field. Before 4.2 billion years ago, there was a catastrophe on mars. Gradually the oceans and the atmosphere of the mars mysteriously vanished away⁷. It might be due to meteorite attack on mars⁸. When the meteorites hit the mars with a huge impact that have melted the crust after that the magnetic field of mars ceased to exist⁹.

A. Present condition of Mars

The Mars is now cold and inhabitable planet. There is frozen carbon dioxide at the polar cap. The atmospheric pressure on mars surface is 600 Pascal about 0.6% of Earth sea level pressure¹¹. The Martian atmosphere consists 96% carbon dioxide, 1.9% Argon 1.9% Nitrogen and few traces of oxygen, carbon monoxide and water¹². The atmosphere of mars is quite dusty giving the Martian sky a light brown or orange red in color. There is usual increase and decrease of methane in the atmosphere¹³. The mars atmosphere consists of mainly three layers:-Exosphere, Thermosphere, Middle atmosphere, Lower atmosphere. Exosphere starts from 200 km from and it has no boundary where the atmosphere ends¹⁴. Thermosphere is the region of high temperature caused by the heating from the sun. Middle atmosphere is the region where the jet stream flows. Lower atmosphere is relatively hot region affected by heat from airborne dust and from the ground¹⁵.

B. Presence of carbon dioxide in mars

Martian atmosphere consist of 96% of carbon dioxide. There is frozen carbon dioxide at the polar cap which clearly shows that Mars was a habitable planet¹⁶. It is argued that rock formation in Mars and rock formation process show the presence of CO₂ but it rock formation can explain of CO₂ pressure¹⁹. If we melt the carbon dioxide ice at the polar cap and then carbon in the atmosphere would trap heat creating a greenhouse effect that back the Martian surface with water¹⁸. Global warming may increase due to presence of co₂ in the atmosphere. This may be one of the way to increase the average temperature and could melt the ice in the polar cap²⁰. We can make use of photon that could break carbon dioxide into carbon monoxide and water and second photon could break carbon monoxide to carbon and oxygen and it would receive enough energy that it would escape from the planet due to solar winds.

C. Artificial atmospheric generator

It is used to create proper atmospheric conditions that can sustain life. If we want to colonize mars we can make use of artificial atmospheric generator. We can make the generator in proper closed air tight chamber that can act as a protective cover from solar winds. Then we can make use of photon in breaking carbon dioxide into carbon monoxide and oxygen. Further we can break molecular carbon monoxide into carbon and oxygen. With help of oxygen we can make water. We can make use of methane in making hydrogen as there is unusual increase of methane in the Martian atmosphere. By the help of photon we can break methane to hydrogen. That hydrogen can be used to make water. The hydrogen can react with oxygen to form water. This how we can make water. We can set up a plant on mars creating proper amount of water that can be used for raising crops. With help of proper amount of water and carbon dioxide the plants can perform photosynthesis and herby producing sugar and oxygen. So there will be proper amount of oxygen in artificial atmosphere. To completely make habitable by using artificial atmospheric generator we have to create artificial gravity¹⁷.

D. Mars and its gravity

Mars have a gravity of 3.711 m/s^2 . Mars gravity is 38% of the gravity of the earth. Mars's gravity was that of the Earth before 4.2 billion years ago²². Scientists have calculated gravity using Newton's law of Universal law of gravitation which states that gravitational force exerted by an object is proportional to its mass. When it applied to the spherical body, the surface gravity will be proportional to the square of the radius²¹. Due to low gravity it is incapable of having proper habitable atmosphere. Due to its low gravity it can't hold the charged ions²⁴. Mars have a carbon dioxide of 96% .photons break the carbon dioxide to carbon monoxide and oxygen and further carbon monoxide breaks into carbon and oxygen. These ions get charged up by solar winds and it escapes from the planet due to low gravity. Mars have all conditions to support life but due to low gravity and lost magnetic field and gravity are two main reasons behind its inhabitability²⁵. If we are going to use artificial atmosphere generator then we have to go for artificial gravity. Humans are adapted to a gravity of 9.8 m/s^2 then with a gravity of 3.711 m/s^2 humans weight will feel lighter they will be able to jump higher. If you weigh 68 kg on Earth, you will weigh 26 kg on mars. So we will have to create an artificially magnetic field to adjust the gravity. I gravity depends on the magnetic field²³.

E. Mars and its magnetic field

Magnetic field is the area under the influence of a magnet where repulsion and attraction can be felt. Earth is also a really big magnet²⁶. The Magnetic field protects planets from Magnetic Field by solar winds and deflects solar winds²⁷. The magnetic field around the earth called as Magnetosphere. The cause of earth's magnetism is actually the earth's internal dynamo²⁸. The magnetosphere is important as it protects the planet and satellite from the solar winds. Mars used to have magnetosphere before 4.2 million years ago. Magnets lose their magnetism due to overheating it²⁹. The mars have lost their magnetic core or dynamo. It is

mainly due to the meteor attacks on mars. Mars have only the outer core that low level of magnetism. Due to meteor attack mars have lost its magnetic core³⁰.

II. STRUCTURES OF MARS

Surface → Crust→ Mantle of silicate rock→ Liquid Iron-Sulphur core→ solid inner core. Surface of mars is 144.8 km/m^2 ³².The mars reflect a portion of light it receives from the sun³¹.The surface mainly consist of basalt rocks and presence of big holes proves the meteor attack on mars .Crust is formed by the melting of the upper portion of the melting. The mantle is the interior region of the mars and it is close to the core. Mantle formed of peridotite rock that is mainly consisting of silicon, magnesium .Olivine is the most abundant mineral in peridotite³⁴. The temperature of interior of Mars is between $800 \text{ }^\circ\text{C}$ and $1500 \text{ }^\circ\text{C}$ considerably lower than the Earth. The core is made up of sulphur, nickel, iron. The radius of the mars is between 1500-2000 km.

III. SOLAR WINDS

Every star releases charged particles known as solar winds into space. The sun has releases powerful charged particles. Solar winds are super-hot, highly charged particles blasting into the space. The plasma mainly consists of mostly electrons, protons and alpha particles with thermal energies of 1.5 to 10keV. Solar winds are released from coronal hole or a coronal mass injection. A stream originating from coronal hole radiates into space. These winds move at a speed of 200 and 300 km/sec. Wind speed generally depends on the size of the star. Plasma rays charged particles generated due to the nuclear reactions on sun. Plasma rays consist of protons and electrons. As the solar activity increase the solar surface is filled with active regions, coronal holes, and other complex structures. Ions have energy equivalent to 15 electrons. Our neighborhood planets Venus and Mars have no oceans; lakes or rivers due to solar winds. Due to having strong magnetic field Earth escaped its fate. Venus and Mars losing seasonal ions like oxygen into space due to solar winds but Earth has a strong magnetic field to stop this. Many space travelers have solar winds. While working in a space station astronauts have felt solar winds. The magnetosphere deflects the solar winds due to Lorentz force. The solar winds also produce a net force on magnetosphere both though a normal stress and tangential stress. Ultimately it is transferred to the Earth. Sometimes plasma charged particles enter into Earth's atmosphere and causes great environmental change. The effects of solar winds can be visible from naked eye are the Aurora Borealis (the Northern lights) at the North Pole and the Aurora Australia (the Southern Lights) at the South Pole. Solar winds can cause change in magnetic pole and also can produce geomagnetic storm which can affect the microchips in computer. Solar winds can damage satellite communication. The sun generates 4 million plasma charged particles in to the space per second. With no magnetism the solar winds took away the essential ions from mars. Solar winds charged the particles. The particles escape into the space. That made mars cold and inhabitable planet. For

terraforming of mars, we need deflect the solar winds. Due to solar winds mars lost its ocean and its oxygen ion throw back into the space. If we can create artificial magnetosphere that would deflect the solar winds, we can bring back the mars to its habitableness state⁴⁹. Artificial magnetic could deflect the solar winds and block the ions from moving into the space.

IV. HYDROLOGY

Liquid water does not exists in the mars because of the very low temperature which is below melting point of water (-63⁰c) and on the other hand due to low atmospheric pressure of the Mars, but when the mars was in habitable in nature then the liquid water was present there. The global ground water of mars been driven by precipitation. Mars have tributaries found on Mars. Large quantities are trapped underneath Mars's thick cryosphere. It is only released due to volcanic action. If the river networks is properly shaped then it follows the basic rules of gravity. If this is true on Mars elevation have not been altered. The geomorphologic indicates

- Water cycling in geological Past
- Atmospheric components leading to the formation of large ancient lakes or an ocean
- Hydrothermal activity

Mars has bright polar ice cap that can be easily visible form telescope on Earth. A seasonal cover carbon dioxide ice and snow is observed the poles during the Martian Year. The researchers have identified a boundary that extends across the entire cap. Polar cap consists of which freezes at a temperature at -125 °C. It also contains water. During the Southern hemisphere’s summer much of the ice sublimates straight back into the gas .Every year ice is deposited every year. Amount of ice deposited per year is slightly more than the thickness of Hair. Greenhouse effect on mars can the average temperature of Mars and could help in melting of ice¹⁰.

V. REASON BEHIND MARS IS INHABITABLE

A. Meteor attack on mars

Meteor attack on mars, there are several pictures showing the meteor attacks on mars. It mainly 4.2 million years ago a catastrophic event took place on Mars. Asteroid impact was so huge that it melted the magnetic core thus destroying mars magnetosphere. Like magnet lose its magnetic field due to overheating. When the meteor impacted on the Martian surface there is huge release of energy. The released energy melted the core of the Mars. Thus destroying the magnetosphere of mars. Thus planet could not deflect the solar winds²².

B. Increase the distance from Sun

In our solar system the mother star is Sun , we all know this but in very slowly rate Sun is losing its energy for this reason the attraction force between Sun and Mars will decrease by this matter the mars will be move away from Sun and for this the Mar’s magnetosphere is losing its strength. For this reason solar wind cannot be deflected so

the temperature will be decreasing gradually. Actually the magnetic field of the Mars is due to the rotation between the solid iron core and mantle of silicate rock. And the inert mediate is liquid iron sulphur. Everyone knows that silicate and iron are the two magnetic materials and they are repeal each other than a frictional force acting between the two layers and generated a electrostatic force which is called gravitational force or nothing else. But this cycle will be working properly when the magnetosphere will be working properly, due to losses of magnetosphere’s energy this cycle could not working properly, and the rate of rotation in between two layers will be slow and the electrostatic force generate will be decreasing so the gravitational force is very small amount²³.

C. Collision between two Gravitational wave

The whole solar system is submersed by gravitational wave and the attraction force between sun and any other planet has been occurring due to this gravitational wave, when the planet is moving then it sticks to the gravitational wave and the disturbing wave will be going away from the planet, that wave has a kinetic energy, this moving wave should be create disturbance to the other planet by its kinetic energy.

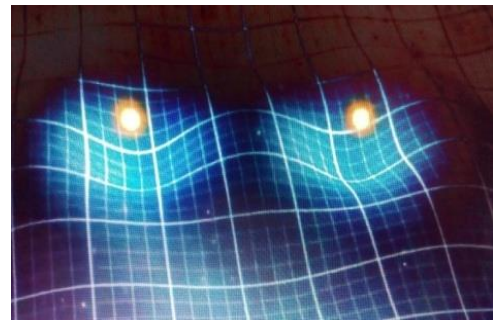


Fig 1:- Collision between two gravitational waves²⁴.

In the case of Mars the above cause had been occurring for lost to habitableness of Mars, because Earth is the nearest planet of Mars, when they are came closer to each other than the disturbing gravitational wave of Earth which has been formed by Earth, that have been strike to the disturbing gravitational wave of Mars which has been formed Mars, and the energy of the disturbing gravitational wave of Earth is always greater than the disturbing gravitational wave of Mars due to the distance from Sun.

For Earth, Here, G_e = gravitational force of Earth , g_e = gravitational constant, M_1 , AND M_2 = masses of two bodies, R_e = distance from Sun

$$G_e = \frac{g_e * M_1 * M_2}{R_e^2}$$

Now for Mars, Here, G_m = gravitational force of Mars, g_m = gravitational constant, M_1 , AND M_2 = masses of two bodies, R_m = distance from Sun

$$G_m = \frac{g_m * M_1 * M_2}{R_m^2}$$

We know that $R_e > R_m$, so the gravitational force of Earth is always greater than gravitational force of Mars, so finally $G_e > G_m$, and the gravitational attraction is occurring for gravitational waves, so we have to say that the gravitational wave energy of Earth is greater than gravitational wave energy of Mars.

So when the gravitational wave of Earth will be collided to the gravitational wave of Mars then the kinetic energy will be distributing from higher to lower, after that

the gravitational wave of Mars get more kinetic energy, and it will be came back to its previous position, that gravitational wave of Mars will be collided with Mars, and the Mars will be effected by it and change its position, By this reason the distance from Mars to Sun is increasing.

Due to above causes Mars had lost its habitableness mainly, but many more other reasons has been there behind the lost of habitableness.

SUBJECT	EARTH	MARS
Diameter	12,756 km	6,794 km
Average distance from Sun	149.6 million km	227.9 million km
Orbital speed around Sun	29.79 km/sec	24.13 km/sec
Sunrise to Sunrise	24 hours	24.63 hours
Mass (Earth = 1)	1	0.11
Volume (Earth = 1)	1	0.15
Average density (water=1)	5.52	3.93
Surface gravity (Earth = 1)	1	0.38
Average surface temperature	15 ⁰ C	-63 ⁰ C
Number of moons	1	2

Table 1. Comparision between Earth and Mars

VI. DISCUSSION AND RESULTS

At first we have to do something which is help for returning magnetic field of Mars. Particular this work will be occurring with the help of Earth’s magnetism process because Structure of Earth is almost same to the Mars (Structure: Crust -> Mantle of silicate rock -> Outer core (liquid iron) -> Inner core (solid iron)). And many other similarities have been present in between Mars and Earth. When the magnetic field will be return then the gravitational force will be also return, and the solar wind also deflected, and increase the temperature.

VII. RESULTS

After the comparison the above table we have to conclude that the Mars is almost equal to our Earth with the help of configuration. But one important parameter has been left from Mars that is magnetic field, if we get back the magnetic field into the mars then the mars will be getting back properly its magnetic field or magnetosphere, and temperature. Now the magnetic field or magnetosphere, and temperature have been present in the Mars but not in habitable condition, by which the Mars had lost its habitableness.

Magnetic field or magnetosphere, and temperature are mainly occur due to the rotational speed of inner solid iron core with respect to the mantle of silicate rock, now the speed is very less so the magnetic field or magnetosphere, and temperature does not generated properly if we increase the speed of rotation of the solid iron core with respect to the mantle of silicate rock, then the chance of possibility to

return the habitableness of Mars will be maximum. We can increase the speed of rotation of the solid iron core with respect to the mantle of silicate rock by increasing the magnetism of the solid iron core, so we have to increase the magnetic intensity of the solid iron core, everybody knows that iron is a pure magnetic material so we can easily increase the magnetic intensity of it by using electricity, if we charged a iron by electricity then the iron will be converted into a magnet, by this mechanism we can increase the magnetic intensity of the solid iron core.

Here I am using LDR (light detect resister) to generate electricity by sun light and that electricity will be charged the solid iron core due to this the solid iron core will be gain more magnetic intensity.

In the other hand I am using UV ray, because UV ray itself a light ray due to this it has photon particle by the duel nature of light. If we project UV ray into a iron core then the iron core will be converted a magnet that would create a magnetic field that would deflect the solar winds.

Now I am using the above techniques to make Mars as a habitable planet, if we placed the three LDR on the Equator line in the position of 3,6,9 because sir Nikola Tesla said the 3,6,9 are the perfect position to transmit the maximum energy and here using electricity itself a energy so I can placed those LDR in this manner after that the electricity which has been produced by those LDR, this electricity will be directly charged the solid iron core through a connection in between the solid iron core and the LDR, and it will be increasing the magnetic intensity of solid iron core.

Now I am using UV ray, from the previous way, if we placed the three UV light ray on the Equator line in the position of 3, 6, 9 because Sir Nikola Tesla said the 3, 6, 9 are the perfect position to transmit the maximum energy and here using light ray itself a energy, after that the light ray will directly project the solid iron surface and it will be increasing the magnetic intensity.



Fig 2:- Position LDR and UV light into the Mars



Fig 3:- Placed LDR and UV light into the Mars

Now the magnetic intensity of the solid iron core has been more than before one, and now the repulsion force in between the solid iron core and mantle of silicate rock is more.

When the magnetic intensity of the solid iron core will be increasing more than the magnetic field will be generated more normally, by this the Mars will be get back its magnetic field.

Now we have to come back gravity of Mars, at first we know that gravitational force is always acting from outer ward to inner ward so it is an external force, and gravitational force is occurring due to gravitational wave, the gravitational wave is stretchable in nature, after that gravitational wave is a kind of wave so it will be deflected by magnetic lines of force, due to this reason when the magnetic intensity of Mars has been increasing then more no of magnetic lines of force will be generating, those magnetic lines of force will be deflecting the gravitational wave by this a curve will be generating under the mars due to stretchable nature of gravitational wave, then the attraction force which is applied on the Mars will be greater than previous one, for example if we placed a metal ball on a stretchable sheet at a equilibrium position and now if we release some small balls from the edge of the stretchable sheet then those small ball are trying to reach to the metal ball with very slow velocity, after that when we applied some tensional force in this system then the metal ball wants

to pulled down and now if we release some small balls from the edge of the stretchable sheet then those small ball are trying to reach to the metal ball with very high velocity with respect to previous one , that means when we stretched something then the tensional force will be more, same as here when the magnetic lines of force of Mars is deflected the gravitational wave then the tensional of gravitational force will be more so the applied gravitational force will also more,

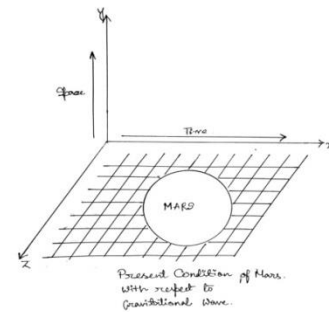


Fig 4:-Present condition of Mars very small or neglected deflection is happening

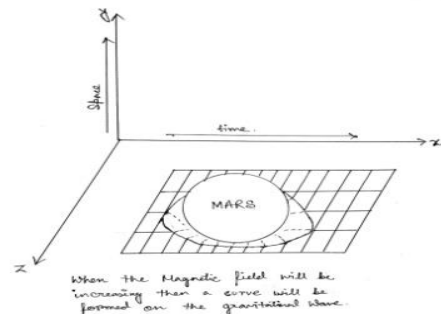


Fig 5''-When the magnetic lines of force will increase then more bending of space and time according to the Einstein's definition of gravity

After that we have to increase the temperature and this is a important thing for habitableness, if we rubbed two hands slowly then heat will be generated due to friction but the amount of heat will be very small or neglected, but if we rubbed two hands very fast then the maximum amount of heat will be generated , same as occur here when the intensity of the solid iron core will be more then the repulsion force in between mantle silicate rock and solid iron core will be also more so the frictional force will be generated more amount of heat than previous one and this heat will be came out by the layer of the Mars, after that this heat will be also increase the atmospheric temperature and ice converted into water, heat is the main thing for living any kind of animal or plant.

VIII. UNIQUENESS

- The whole process to make Mars as a habitable planet by using the natural resources which are available in the Mars.
- Maximum energy used to make Mars as a habitable planet is solar energy.
- The maintenance cost is less.
- The process is not a short time working process; it could be working in longer time.
- With the help of this technique, we can get back water on Martian surface.

IX. DRAWBACKS

- The installation cost will be heavier.
- This process could not be huge changed to the atmosphere

X. CONCLUSIONS

A. Effect of Increasing Magnetic Field

When the magnetic field will increase then the repulsion force between two internal layers of Mars will increase, due to this the frictional force will be generated more and also generated heat which heat will be occurring to increase the temperature of the atmosphere of the Mars. Last but not the least when the magnetic force of repulsion in between two surfaces will be increasing then the gravitational force will be also increasing. And when the magnetic field of Mars came back then it will be deflect the solar winds which solar winds are keep the temperature normally as a habitable planet. By this way we shall get back the gravity and normal atmospheric temperature of a habitable planet.

B. Effect of Temperature Increasing

Water plays a big role in a living life, if we can get water from anywhere then there will be a chance for living, in the Mars the total water had be frozen under the surface of Mars, if the frozen liquid of Mars will be converted into liquid state or normal water and the water will be come back again which is a grateful significance of the habitable planet. And the living temperature will be returned again.

C. Effect of Gravity Increasing

When the gravity of Mars will be increasing then it will capable to hold charge and does not break the carbon dioxide to carbon mono oxide and oxygen, so the harmful carbon mono oxide will be not produced, by this the Mars will be get back its habitableness.

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