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The Effect of the Climate's Elements on the Sun Radiation in Babylon for 2015.

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ABSTRACT

In this study special equations had used for calculation the quantity of the solar radiation which incident perpendicular on the Babylon city, the benefit of this study is exploitation the solar energy by solar cell to get the electricity. The data of the weather from the meteorological station in College of Education for pure sciences contains the information of the Monthly average of the Solar Radiation with absence atmosphere $H_0(MJ/m^2.day)$, the Monthly Average of the theoretical solar radiance(hr) and Relative Air Mass $M(z)$ from 1/January / 2015 to 31/ December / 2015. The results of this study explains the effects of the climate's elements (degree of temperature and the relative of humidity), on the solar Radiation. In this study I will discover that we can transform the solar radiation in the Babylon city to the electricity by using the solar cells.

Keywords: climate, elements, sun radiation.

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The data of the weather from the meteorological station in College of Education for pure sciences from January to December2015

The data of the Solar Radiation of the Babylon city which was obtained from the meteorological station is in my College. I will use this data do the calculations and diagrams.

This calculations and diagrams will show information of Solar Radiation in the Babylon city. Look at the table (1).

Table (1): The data of the Solar Radiation in the Babylon city for eight months in 2015

Month		Monthly Average of the Solar Radiation with absence Atmosphere H_0 $(MJ/m^2.day)$	Monthly Average of the theoretical solar radiance (hr)	Relative Air Mass $M(z)$
1	January	19.83361056	10.14783814	0.937176743
2	February	24.97763983	10.9821683	0.867106257
3	March	32.18968954	11.93144926	0.771560263
4	April	37.91405184	12.87263564	0.726804139
5	May	41.654944	13.78510049	0.689956482
6	June	42.76540105	14.13678652	0.686922746
7	July	41.43962693	13.90297176	0.69873465
8	August	37.19377812	13.14248017	0.709412391
9	September	31.6353789	12.14368373	0.782836231
10	October	25.15436905	11.150144807	0.819893094
11	November	20.19301733	10.30106723	0.928013268
12	December	18.3267675	9.899657153	0.999831796

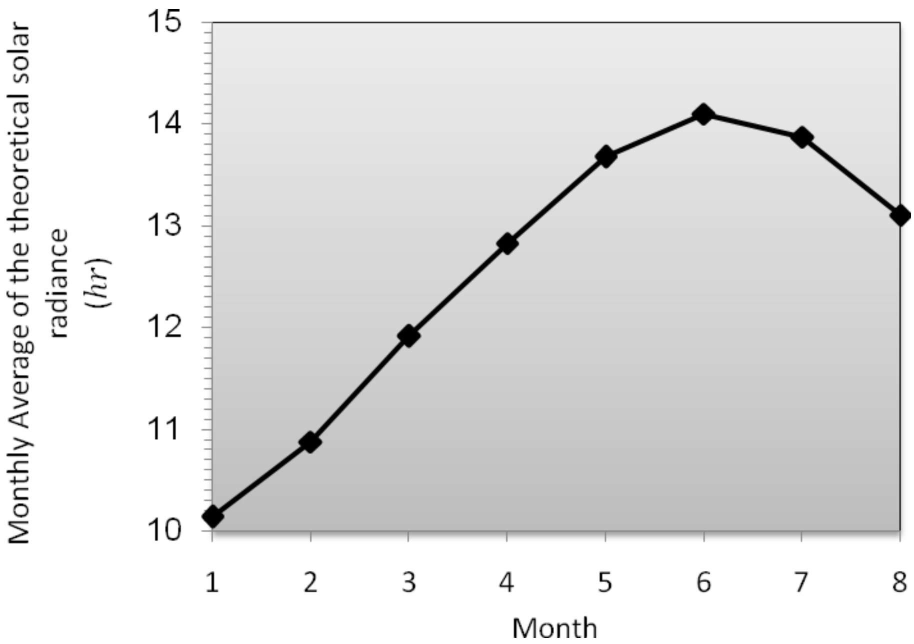

Fig (1): Diagram of the Monthly Average of the theoretical solar radiance for the eight months in Babylon city for2015.

At the general, the values of the Monthly Average of the theoretical solar radiance in the Babylon city to be distinguished by height in all months especially in May, June and July. But it is slightly low in January and February.

The total Average of the theoretical solar radiance in Babylon city is $12.57032\ hr$.

The effect of change in temperature and relativity of moistness on the solar radiation

The quantity of the solar radiation which arriving to any point in the earth is final resultant for any angle of the solar ray and the period of solar radiancetherefore there are many of equations which used to expression The quantity of the solar radiation which arriving to the earth.

The Angstrom equation is very important equation. It used to calculation the quantity of the solar radiation and the period of solar radiance.

$$\frac{H_{cal}}{H_0} = a + \left(b \cdot \frac{S}{S_0}\right) \quad \dots (1)$$

H_{cal} is the quantity of the total solar radiation which incident perpendicular on the earth.
,H_0 is the solar radiation outside the atmosphere.
, S is the period of the practical solar radiance.
,S_0 is the period of the theoretical solar radiance.
, a and b is a constants, it is dependent on the place of city.

For the place of Babylon city$a = 0.0379$ and $b = 0.5389$ these constants has a no unit.

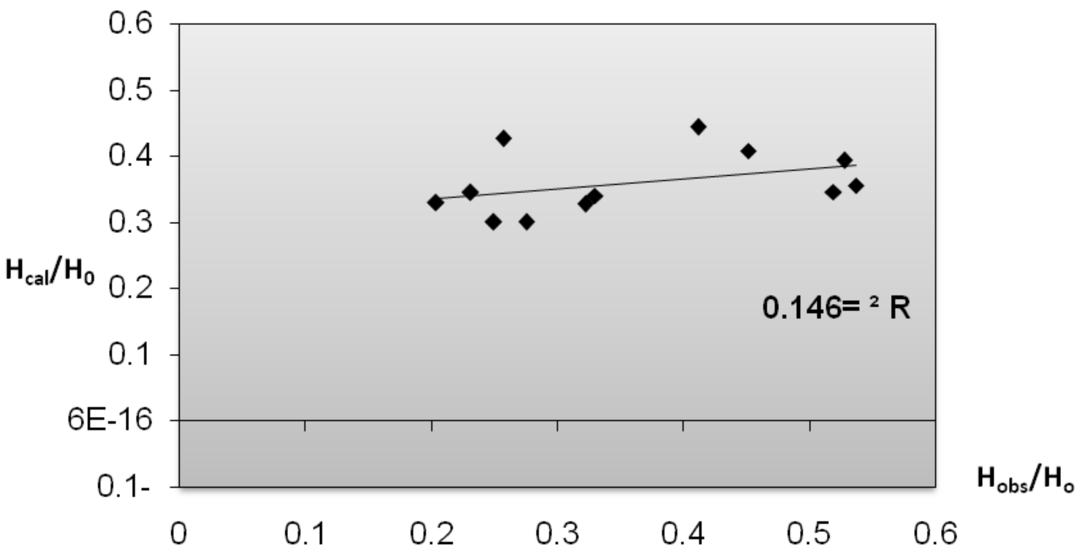

Fig (2): The slope between the relative of the incidence solar radiation in Equation (1) with the relative of the absorbent solar radiation in the Babylon city in 2015.

When we take the climatic inductions on the incidence solar radiation (degree of temperature and the relative of humidity), we will get the following equation:

$$\frac{H_{cal}}{H_0} = 0.511 + \left(0.664\frac{S}{S_0}\right) - (0.013T_{av}) - (0.005R.H_{av}) \quad \cdots (2)$$
$$\frac{H_{cal}}{H_0} = -0.215 + \left(0.516\frac{S}{S_0}\right) + \left(-\frac{3.279}{T_{av}}\right) + (0.015R.H_{av}) \quad \cdots (3)$$
$$\frac{H_{cal}}{H_0} = 1.999 + \left(-1.63\frac{S}{S_0}\right) + (0.015T_{av}) + \left(-\frac{30.562}{R.H_{av}}\right) \quad \cdots (4)$$

$$\frac{H_{cal}}{H_0} = 0.208 + \left(-0.023\frac{S}{S_0}\right) + \left(\frac{5.651}{T_{av}}\right) + \left(-\frac{3.768}{R.H_{av}}\right) \quad \cdots (5)$$

$$\frac{H_{cal}}{H_0} = 1.306 + \left(0.874\frac{S}{S_0}\right) + (-0.021T_{av}) + (-0.006\ R.H_{av}) + (-0.026[T_{max} - T_{min}]) \quad \cdots (6)$$

$$\frac{H_{cal}}{H_0} = 0.216 + \left(0.587\frac{S}{S_0}\right) + (-0.011T_{av}) + (0.009R.H_{av}) + (0.004[R.H_{max} - R.H_{min}]) \quad \cdots (7)$$

$$\frac{H_{cal}}{H_0} = 11.899 + \left(1.838\frac{S}{S_0}\right) + (-0.165T_{av}) + (-0.161R.H_{av}) + (-0.11[T_{max} - T_{min}]) + (0.029[R.H_{max} - R.H_{min}]) \quad \dots (8)$$

And when we sketch the figures of these equations with the absorbent solar radiation, we will get following figures:

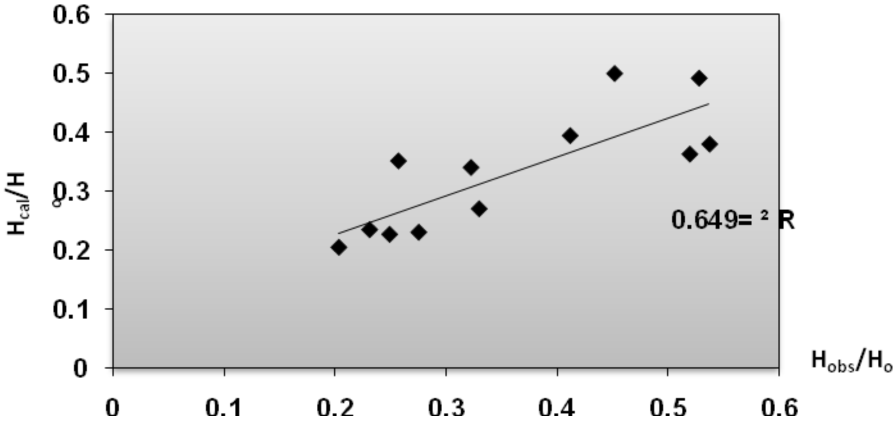

Fig (3): The slope between the relative of the incidence solar radiation in Equation (2) with the relative of the absorbent solar radiation in Babylon city for2015.

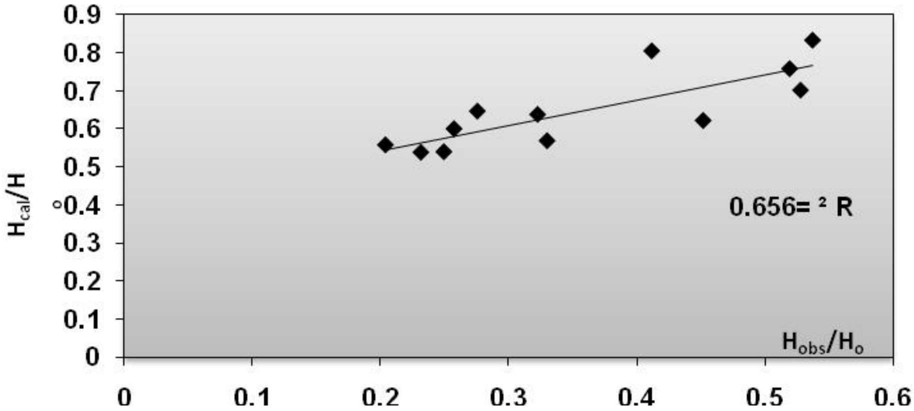

Fig (4): The slope between the relative of the incidence solar radiation in Equation (3) with the relative of the absorbent solar radiation in Babylon city for2015.

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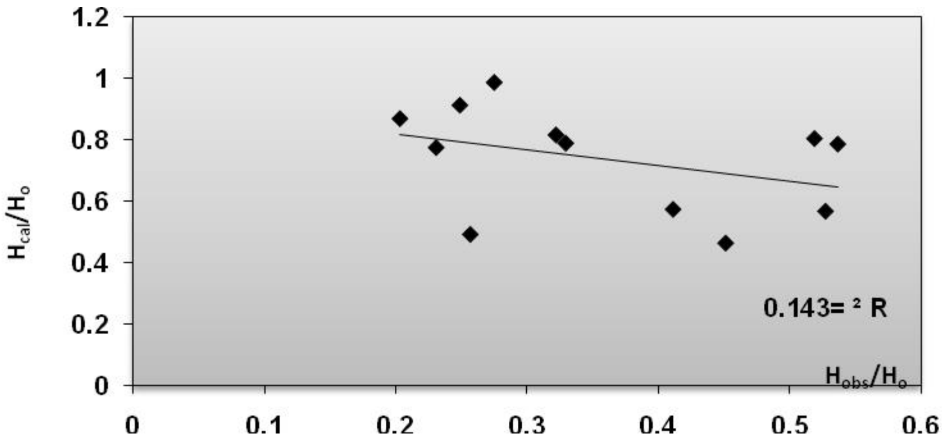

Fig (5): The slope between the relative of the incidence solar radiation in Equation (4) with the relative of the absorbent solar radiation in Babylon city for2015.

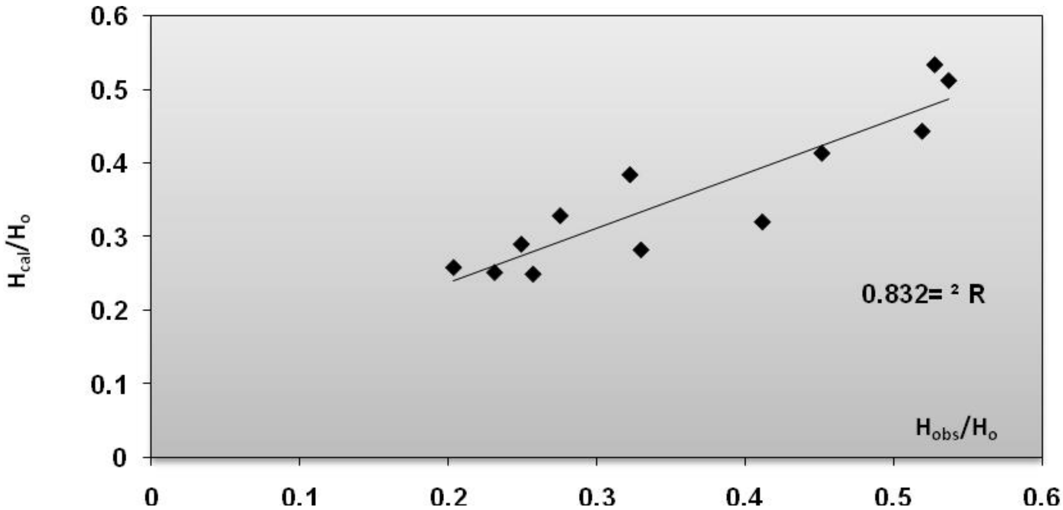

Fig (6): The slope between the relative of the incidence solar radiation in Equation (5) with the relative of the absorbent solar radiation in Babylon city for2015.

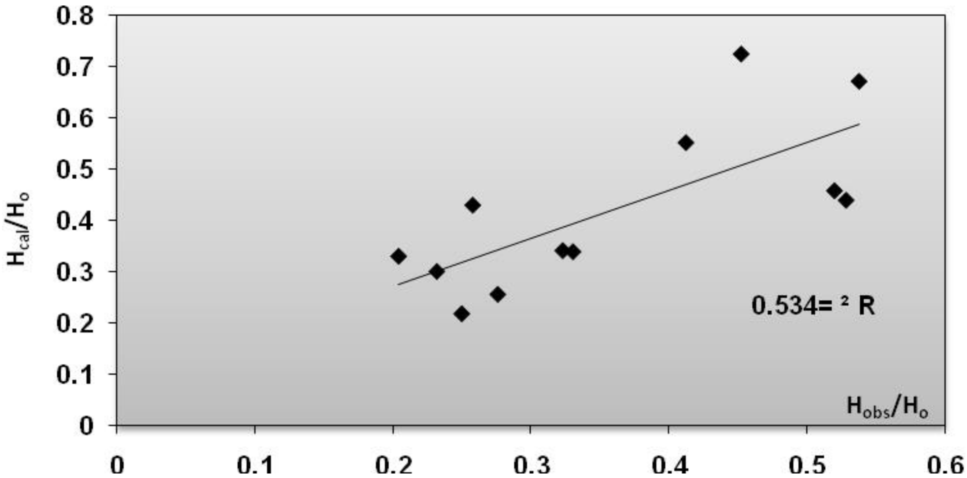

Fig (7): The slope between the relative of the incidence solar radiation in Equation (6) with the relative of the absorbent solar radiation in Babylon city for2015.

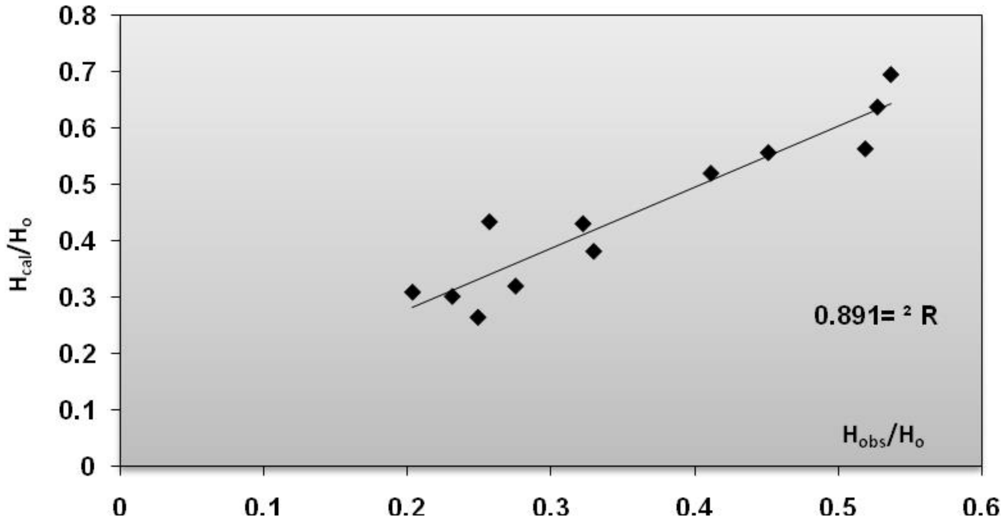

Fig (8): The slope between the relative of the incidence solar radiation in Equation (7) with the relative of the absorbent solar radiation in Babylon city for2015.

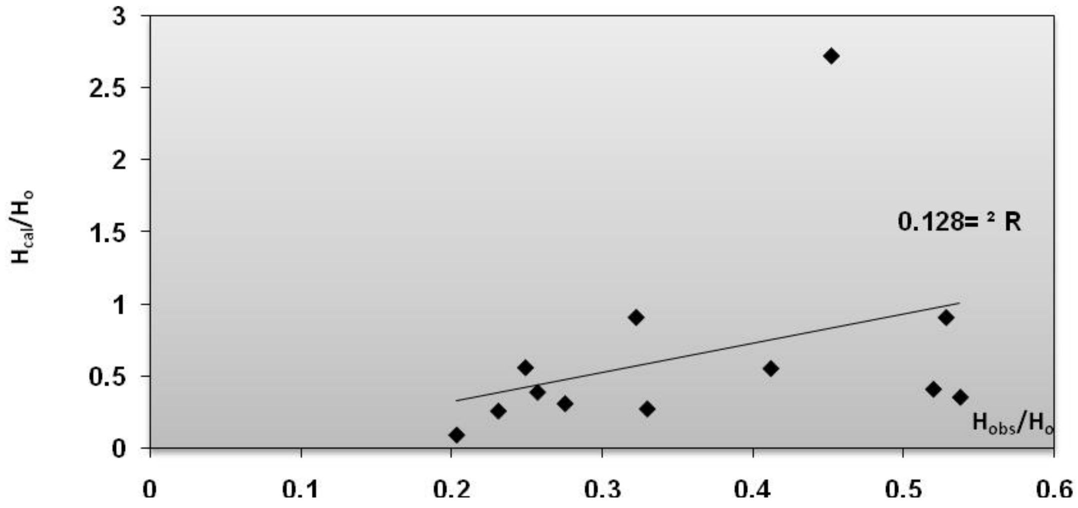

Fig (9): The slope between the relative of the incidence solar radiation in Equation (8) with the relative of the absorbent solar radiation in Babylon city for2015.

DISCUSSION

The average value of the solar radiation in the Babylon city in 2015. is relative law in the winter and first of the spring (January, February, March and April) but it is high in the summer and last of the spring (May,June,July and August).

In the winter, the average value of the solar radiation is between$(19 - 38\ \mathrm{MJ/m^2.day})$, and in the summer it is between $(37 - 43\ \mathrm{MJ/m^2.day})$, this is because place of Babylon city in the earth and the angle of the incident solar ray, this angle is inclined in the winter beside the sky is full of clouds and rains and the humidity is high.

In the summer, the angle of the incident solar ray is perpendicular, the sky is clean and the humidity is law therefore the average value of the solar radiation is high.

The Monthly average of the solar radiance effects on the solar radiation too, it is between $(10-13\ hr)$ in the winter and it is between $(13-14\ hr)$ in the summer.

CONCLUSION

1. The average value of the solar radiation in Babylon city for2015. is equal $(34.6632\ \mathrm{MJ/m^2.day})$, and the monthly average of the solar radiance is equal $(12.57032\ hr)$, we can get 400 watt for any meter square of Babylon city in about $(12.5\ hr)$ if we get competent solar cell:

$$34.6804\,\frac{\mathrm{MJ}}{\mathrm{m^2.day}} = \frac{34.6632\times10^6\ \mathrm{J}}{\mathrm{m^2.}(24\times60\times60)\mathrm{sec}} \approx 400\,\frac{\mathrm{J}}{\mathrm{m^2.sec}} = 400\,\frac{\mathrm{watt}}{\mathrm{m^2}}$$

2. From the data of the table (1), when the monthly average of the solar radiance is maximum and the relative air mass is minimum the solar radiation become maximum, and when the monthly average of the solar radiance is minimum and the relative air mass is maximum the solar radiation become minimum.
3. The maximum average value of the solar radiation is equal $(42.8264\ \mathrm{MJ/m^2.day})$ in the summer in August and the minimum average value of the solar radiation is equal $(19.6436\ \mathrm{MJ/m^2.day})$ in the winter in January.

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