IOSR Journal of Electronics and Communication Engineering (IOSR-JECE)
e-ISSN: 2278-2834,p- ISSN: 2278-8735.Volume 12, Issue 6, Ver. I (Nov.- Dec. 2017), PP 01-06
www.iosrjournals.org

Investigation Magnetic field emitted from transmission lines in Khartoum state

Mohammed Idriss. Ahmed[1],Mohammed Osman Sid Ahmed[2]
[1]*Department of Physics, faculty of science, Sudan University of science and Technology, Khartoum-Sudan*
[2] *Sudan Atomic Energy Commission (SAEC), Khartoum –Sudan*

Abstract: *Nowadays, the world is in a race towards upgrading modern Technology. Thus, using magnetic fields in power transmission lines indifference cause such as the electrical engineering, Electra mechanics and mega - electronic. The transmission lines are considered of exposure to magnetic field through electric current inside whole body. The paper is directly represented the magnetic field in Khartoum state by using the Aaronic 4040 X device, the magnetic field mean emitted of50 transmissionsline was found (0.224 nT), However. The magnetic field in Khartoum this indicate that the Sudan is a minimum value of magnetic field corresponding to International Guideline .of Transmission line in Sudan an adverse heath effect is minimum safe value than International Guideline. Also, the people living the near of Transmission line can use minimum distance < 50 m.*
Key word: *Magnetic Field, Transmission line, heath, exposure, EMFs*

Date of Submission: 2810-2017 Date of acceptance: 16-11-2017

I. Introduction

The exposure to electromagnetic fields (EMFs) is not a new phenomenon. Within the 20th century, people are more exposed to the artificial sources of EMFs, that are in a continuous increase due to the growing demand for electricity, modern technologies and the change in the people's social behavior. However, the fact that there are a lot of benefits that are gained from using electricity in everyday life and health care, the people's concern about the influence of exposure to both electric and magnetic fields at low frequencies on their health [1].

The principle condition of creating magnetic fields isthe existence of electric current such as the motion of the electric charges (electrons) in a conductor [1-2]. It must be known that, within an electric line, the magnitude of a magnetic field is directly proportional to the current flow [2].On the other hand, there is no relationship between the strength of the magnetic field and the applied voltage. Related to the electric transmission lines, it is not surprising, for example, for a 63 3 (kV) electric line to possess a higher magnetic field than that of the 115 kV line. Also, high voltage 400 kVLines can have large currents so it can produce relatively high magnetic fields, but, in contrast, distributionLines with voltages less than 63 kV can yield fields similar to those measured around a transmission line in case of carrying enough current. Another property of magnetic fields that its influence becomes weaker with increasing the distance from the source, but the magnetic fieldcan pass through most non-metallic materials and thus it is difficult to shield against [3].

Related to the transmission line design, it is well-known that the electric lines that attract the most public interest are often high-voltage transmission lines. The high-voltage transmission lines are the largest and the most visible electric lines so they are heavily required in largest cities for ensuring reliable electric service. Figure 2 represents an example of two 345-kV double-circuited transmission structures which shares the same right-of-way (ROW). The transmission lines are larger than most of the common distribution lines that are used along the rural and city streets. They possess poles or structures of tallusually between 60 and 140 feet, while the distribution line structures are of tallbetween 40 to 60 feet. There are several kinds of transmission structures. Transmission structures can be madefrom metal or wood and can consist of single or multi-poles. They can be single-circuited, carrying one set of transmission lines or double-circuited with two sets of lines. Figure 1displays a group of a commonly built double-circuited, single-pole transmission structure[3].

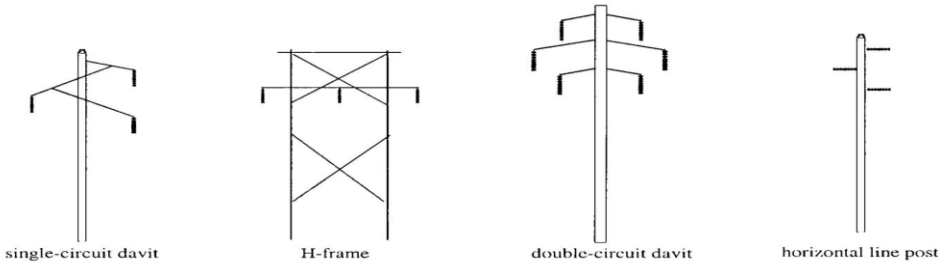

Figure 1: Diagram of different types of transmission structures.

II. Method of Material

with the direct distance to an antenna .The most likely situation where this could occur would be expected to increasing the electric field strength by a factor of up to two ,thus the total power density would be increased by a factor of up to four .The use equation 3 will overestimate power density in directions other than the main beam, because the antenna gain is effectively less in these directions. [2][3][4] [10] [11].

1. Calculation and Method Materials

In the present study the device used for the measurement is called the "Active Log Per measurement antenna Aaronia Hyper LOG 4040 X". It has possible analysis and measurements within frequency range (400MHz - 4GHz) Coverage of various mobile radio frequency ranges Suitable for field-strength and EMC measurements due to high precision Can be used in the lab and for open-field application . The area of was selected for the present study which demonstrates the use of various types of antennas and measurement at difference distance. In the survey a GPS device was used to locate the coordinated of antennas. Measurements were performed up to 150m far from the antenna. At each location the type of antenna is determined using accompanied software (Aaronia Lcs analyzer). The measuring devices (Hyper LOG 4040 X) are connected to a laptop for calibration purposes and to analyze the spectra. For each antenna the following data is obtained: exposure, electromagnetic electric field. In order to obtain more accurate values, many measurements are normally performed at every location. The following data is also recorded: power density, electric field and magnetic field. Figure shows display of spectrum and result of typical measurements. [9]with the direct distance to an antenna .The most likely situation where this could occur would be expected to increasing the electric field strength by a

factor of up to two ,thus the total power density would be increased by a factor of up to four .The use equation 3 will overestimate power density in directions other than the main beam, because the antenna gain is effectively less in these directions. [2][3][4] [10] [11].

1. Calculation and Method Materials

In the present study the device used for the measurement is called the "Active Log Per measurement antenna Aaronia Hyper LOG 4040 X". It has possible analysis and measurements within frequency range (400MHz - 4GHz) Coverage of various mobile radio frequency ranges Suitable for field-strength and EMC measurements due to high precision Can be used in the lab and for open-field application . The area of was selected for the present study which demonstrates the use of various types of antennas and measurement at difference distance. In the survey a GPS device was used to locate the coordinated of antennas. Measurements were performed up to 150m far from the antenna. At each location the type of antenna is determined using accompanied software (Aaronia Lcs analyzer). The measuring devices (Hyper LOG 4040 X) are connected to a laptop for calibration purposes and to analyze the spectra. For each antenna the following data is obtained: exposure, electromagnetic electric field. In order to obtain more accurate values, many measurements are normally performed at every location. The following data is also recorded: power density, electric field and magnetic field. Figure shows display of spectrum and result of typical measurements. [9] In the present study, the device used for the measurement is called the "Active Log Per measurement magnetic field by Aaronia Hyper LOG 4040 X". It has possible analysis and measurements within frequency range (400MHz - 4GHz) Coverage of various radio frequency ranges Suitable for field-strength and EMC measurements due to high precision Can be used in the lab and for an open-field application . The area of was selected for the present study which demonstrates the use of various types of Transmission lines and measurement at difference distance. Measurements were performed up to (10,20,30,40,50,60,70,80,90,100) far from the transmission liens. At each location, the type of Transmission lines is determined using accompanied software (Aaronia Lcs analyzer). The measuring devices (Hyper LOG 4040 X) are connected to a laptop for calibration purposes and to analyze the spectra. For each Transmission lines, the following data is obtained: exposure, magnetic field. In

order to obtain more accurate values, many measurements are normally performed at every location. The following data is also recorded magnetic field. Figure 2,3 shows display of spectrum and result of typical measurements

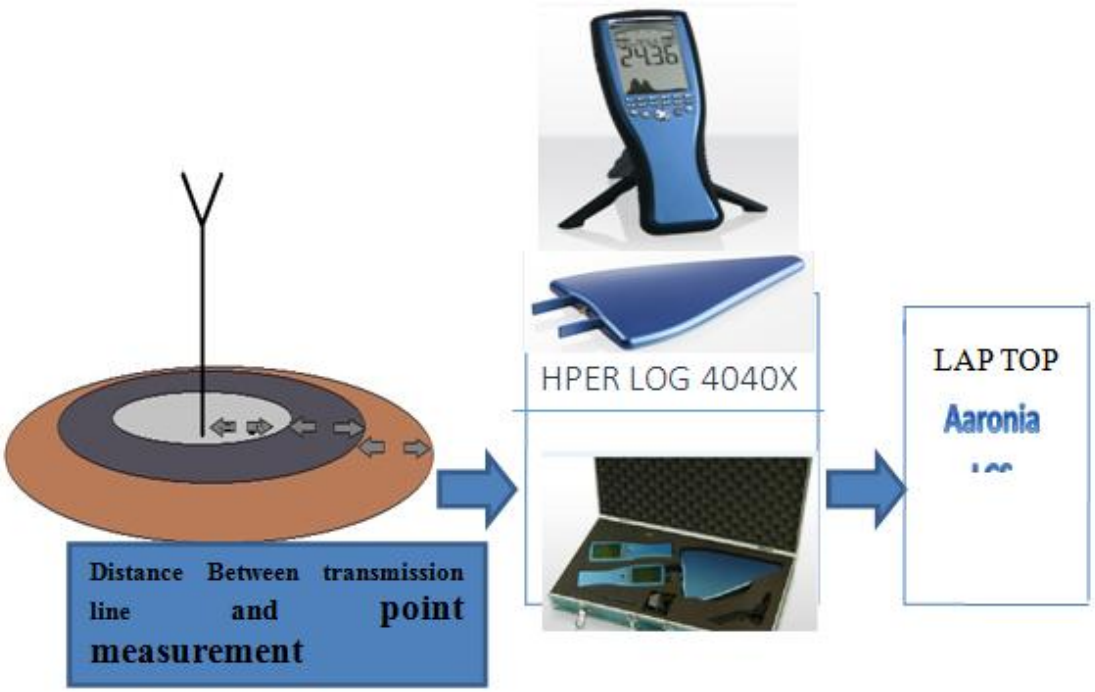

Figure 2: to show the device measurement

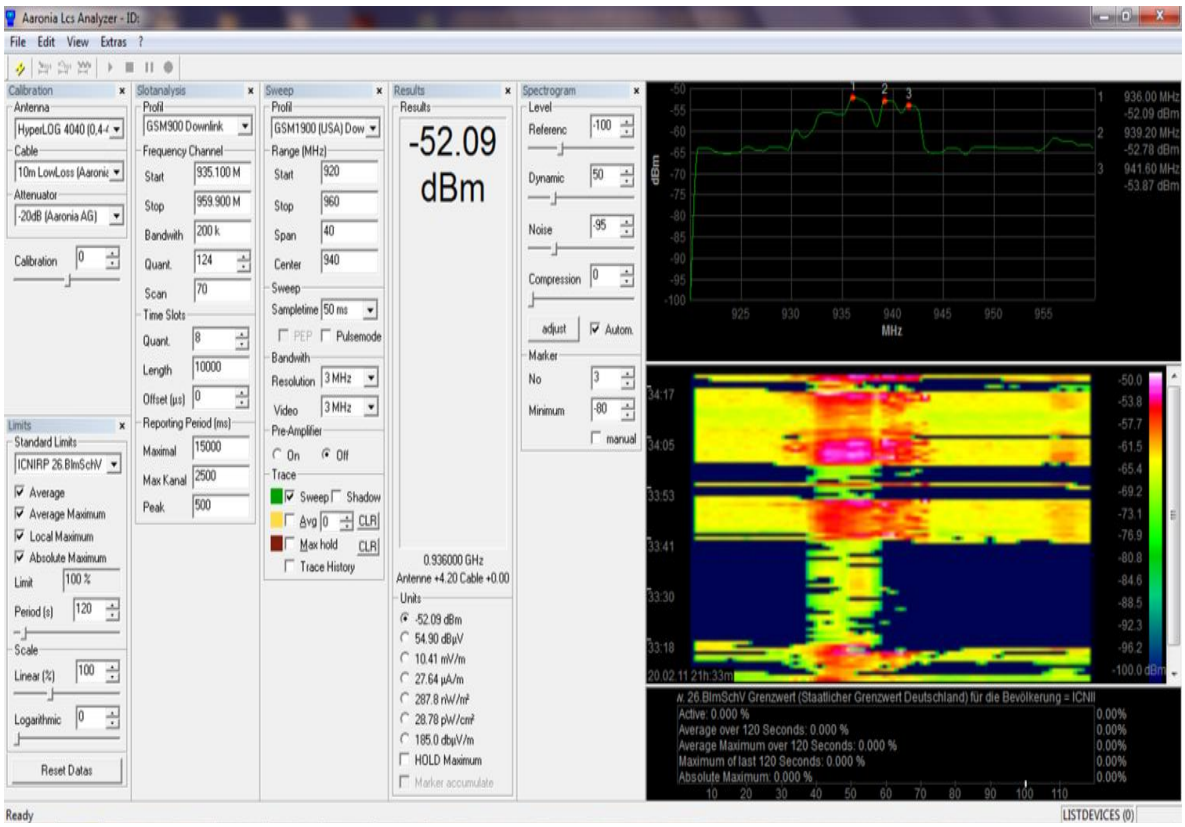

Figure 3: A typical spectrum obtained from the analyzer

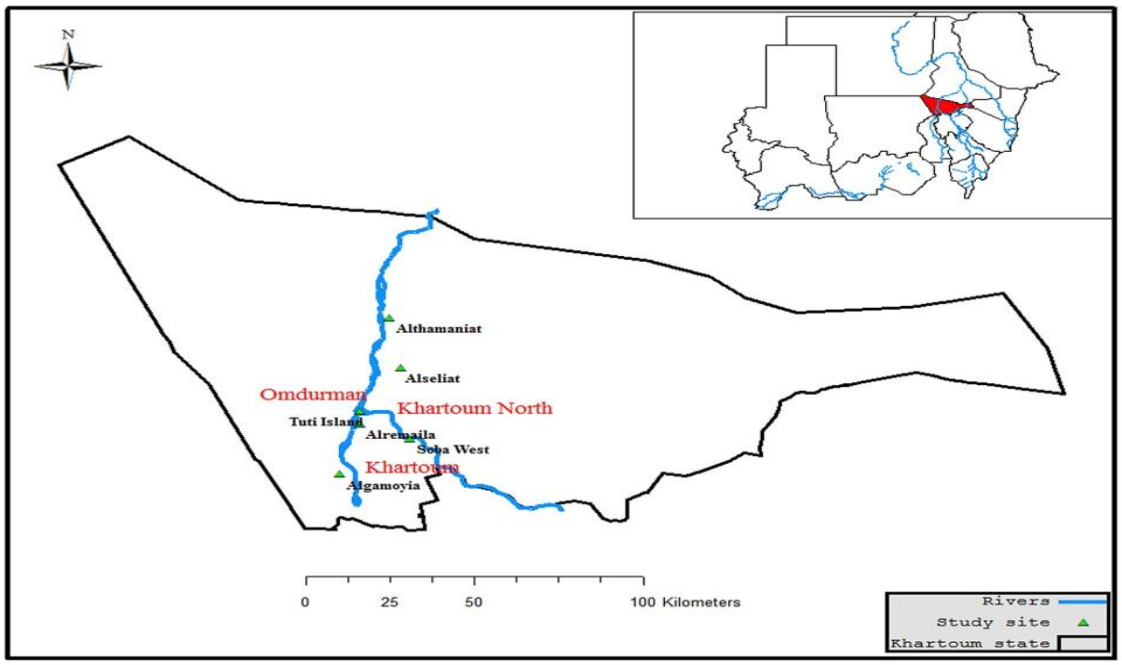

Figure 4: map show the study area

III. Result

Table 1: to Show the Magnetic Field of International Originzations &Countries comparing with Sudan Republic

No	International Originations& Countries	Magnetic fields (nT)
1	National Council of Radiation Protection and Measurements(NCRP)	**1.000**
2	American Conference of Governmental Industrial Hygienists(ACGIH)	**100.000**
3	International Commission on Non-Ionizing Radiation Protection(ICNIRP)	**5.000.000**
4	Sudan **Republic**	**22.4169**
5	Germany	**10.000**
6	Russia	**1.000**
7	Italy	**500.00**

with the direct distance to an antenna .The most likely situation where this could occur would be expected to increasing the electric field strength by a factor of up to two ,thus the total power density would be increased by a factor of up to four .The use equation 3 will overestimate power density in directions other than the main beam, because the antenna gain is effectively less in these directions. [2][3][4] [10] [11].

1. Calculation and Method Materials

In the present study the device used for the measurement is called the "Active Log Per measurement antenna Aaronia Hyper LOG 4040 X". It has possible analysis and measurements within frequency range (400MHz - 4GHz) Coverage of various mobile radio frequency ranges Suitable for field-strength and EMC measurements due to high precision Can be used in the lab and for open-field application . The area of was selected for the present study which demonstrates the use of various types of antennas and measurement at difference distance. In the survey a GPS device was used to locate the coordinated of antennas. Measurements were performed up to 150m far from the antenna. At each location the type of antenna is determined using accompanied software (Aaronia Lcs analyzer). The measuring devices (Hyper LOG 4040 X) are connected to a laptop for calibration purposes and to analyze the spectra. For each antenna the following data is obtained: exposure, electromagnetic electric field. In order to obtain more accurate values, many measurements are normally performed at every location. The following data is also recorded: power density, electric field and magnetic field. Figure shows display of spectrum and result of typical measurements. [9] with the direct distance to an antenna .The most likely situation where this could occur would be expected to increasing the electric field strength by a factor of up to two ,thus the total power density would be increased by a factor of up to four .The use equation 3 will overestimate power density in directions other than the main beam, because the antenna gain is effectively less in these directions. [2][3][4] [10] [11].

1. Calculation and Method Materials

In the present study the device used for the measurement is called the "Active Log Per measurement antenna Aaronia Hyper LOG 4040 X". It has possible analysis and measurements within frequency range (400MHz - 4GHz) Coverage of various mobile radio frequency ranges Suitable for field-strength and EMC measurements due to high precision Can be used in the lab and for open-field application . The area of was selected for the present study which demonstrates the use of various types of antennas and measurement at difference distance. In the survey a GPS device was used to locate the coordinated of antennas. Measurements were performed up to 150m far from the antenna. At each location the type of antenna is determined using accompanied software (Aaronia Lcs analyzer). The measuring devices (Hyper LOG 4040 X) are connected to a laptop for calibration purposes and to analyze the spectra. For each antenna the following data is obtained: exposure, electromagnetic electric field. In order to obtain more accurate values, many measurements are normally performed at every location. The following data is also recorded: power density, electric field and magnetic field. Figure shows display of spectrum and result of typical measurements. [9]

Figure 5: Magnetic Field of International Originations& Countries comparing with Sudan Republic Distances

Table 2: to Show the mean of Magnetic Field in Khartoum state in difference Distances from transmission lines

Magnetic Field	42.59	18.33	27.39	21.7	16.31	4.78	1.37	9.8	27.3	19.11
Distance (m)	10	20	30	40	50	60	70	80	90	100

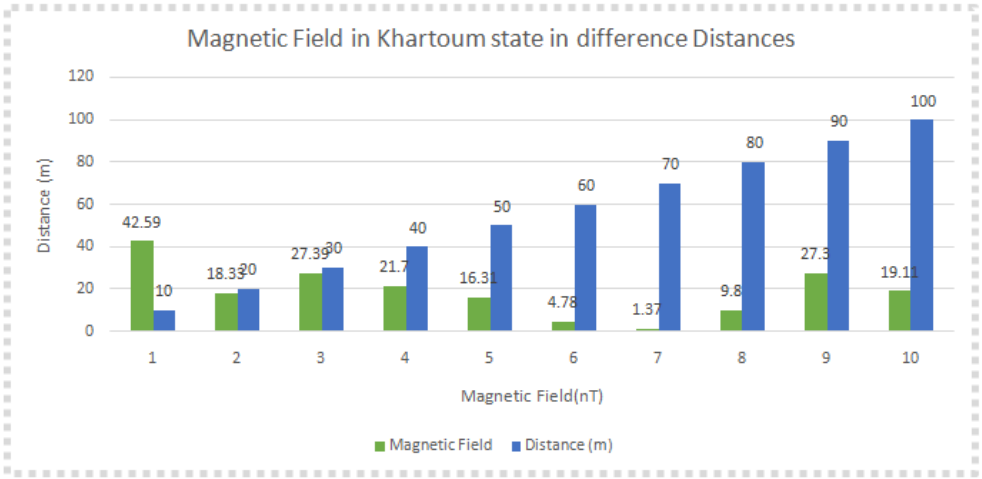

Figure 6: Magnetic Field in Khartoum state in difference Distances

This bar chart shows the different reading for a magnetic field in the Khartoum state in 2016 from difference distances. It is immediately apparent that the most common purposes for the magnetic field were

coming in measurement at distance 10 m and 30 m because is nearest to the transmission line. The next most common magnetic field was distance 90m and doing the distance 20m.

The magnetic field rise dramatically between 1 and 10m, that the noticeable difference Typically, there were few major differences between magnetic field in Khartoum state. In 60m, 70m have represented the smallest value, while the prove the inverse law between power and distance. In reading 20m, almost twice and the reading in 80m.Overall, the reading in the bar chart is the lowest values when it comparing the international Guideline.

IV. Result & Discussion

In this paper, the date Analyses showed a distribution covering the whole area under Investigation. The table 2 and figure 6, represented, the magnetic field we present the results by Aaronic 4040 X software during our survey

Tables and figures above show details of results obtained the value of the electric field and internationals organizations, Transmission lines were measured in the selected area where assessment of Magnetic Field Emitted from a base station is done. The base-station was chosen to represent different Transmitters lines.

Obviously, the table 2 and Figure(6) show the distribution and relation between Transmission lines and distance According to the Statistical Results This may allow predicting exposure values for every person living near of transmission line

V. Conclusion

General view to the dates one can conclude that the obtained values Magnetic fields from transmission lines are at the Low levels if compared with ICNRP recommendation for RF permissible levels

References

[1]. A.S.Safrigiamni and C.G.Tsompanidou.Measurements of electric and Magnetic Fields Due to the operation of indoor Power Distribution Substations.IEEE Transactions on power Delivery, vol 20, pp1800-1805, July 2005.
[2]. R. G. Olsen, V. L. Chartier, "The Performance of Reduced Magnetic Field Power Lines, Theory and Measurements on an Operating Line", IEEE Trans. on Power Delivery, Vol. 8 No.3, pp. 1430-1422, July 1993.
[3]. J. R. Stewart, et al., "Magnetic Fields from Electric Power Lines: Theory and Comparison to Measurement," IEEE Trans. of Power Delivery, Vol. 3, pp. 2127-2136, April 1993
[4]. http://www.Aaronia" www.Aaronia .de.

Mohammed Idriss. Ahmed Investigation Magnetic field emitted from transmission lines in Khartoum state." IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), vol. 12, no. 6, 2017, pp. 01-06.