Department of Electrical Engineering
Final Assignment
Date: 24/06/2020

Course Details

Course Title: Research Methodology for Engineers
Module: MS EE
Instructor:
Total Marks: 50

Student Details

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Student Signature:

Q1.		Develop a **new research proposal** from a **published paper** and that is shared with you already and is also available on https://doi.org/10.21833/ijaas.2018.02.003 Read this paper thoroughly and you may also search for related papers. See the abstract, keywords, introduction sections. In particular read the discussion and conclusions section and find suggestions for further work. So actually this can be used as a guide to help you develop your own research proposal. Write research timelines (and budget if applicable). So in this question you have to **write a research proposal** based on this published paper and make sure that it cover all necessary contents needed for a research proposal.	Marks 25
Q 2		From the **published paper**, which is already shared with you and also available on https://www.researchgate.net/publication/331186119_Impact_of_Nonlinear_Impairments_on_Power_Budget_and_Transmission_Power_Penalties_in_High_Capacity_Long_Haul_Optical_Networks You are asked to **remove/obscure the title**, authors and abstract. You are then asked to read the paper. You are now required to write a **new title** and **abstract** of this paper using 100-150words, based on what you believe are the important issues in the paper. (Marks 10) If you critically appraise this particular paper then you will find **a technical mistake**, what is that mistake, **highlight** or mention it. (Marks 05)	Marks 15
Q 3		Plagiarism is a very important issue, so how well do you understand **plagiarism**? **Discuss HEC policy and criteria** of plagiarism.	Marks 05
Q 4		Measure of **research impact factor** plays a very important role in ranking of journal/conference or a researcher. Nowadays **HEC** has adopted a new **journal recognition and ranking criteria**, discuss your understanding of HEC journal recognition and ranking policy.	Marks 05

Note: Student must write answer in word document, so that plagiarism test can be run. Do not take images of your answers (hand written) as done previously. Do not copy from eachtoher.

Power Budget and Transmission Power Penalties of the High Capacity Long Haul Optical Network under the Influence of Nonlinear Impairments

Abstract:

Practically, Fiber-Optic communication systems usually underperform in presence of the nonlinear impairments. In this paper a theoretical model is presented which is based on the power budget and transmission power penalties of a high capacity long haul optical network influenced by the nonlinear impairments. Bit Error Rate (BER) and Signal to Noise Ratio (SNR) are used to evaluate the proposed model. 50 km and 100 km fiber lengths are used for which the proposed model achieved better results in terms of the BER. It is concluded that transmission power becomes poor when the distance is increased. The power penalties are calculated in terms of BER for Back to Back (B2B) situation and subsequent to transmission over 50 km in single mode configuration that is 1 dB. Whereas, The power penalties are calculated in terms of BER for Back to Back (B2B) situation and subsequent to transmission over 50 km in single mode configuration that is 2 dB. The effects of affective area on the transmission feat are also discussed. The results showed that BER and quality factor decreased when the affective area is increased and minimized the impacts of nonlinearities. The eye diagram showed better depiction of the proposed model. Hence, mitigating nonlinearities significantly improve the transmission performances of a high capacity long-haul optical network.

Title of the Proposal

Temperature and Wind impacts on Sag and Tension of AAAC Overhead Transmission Line

Submitted by

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1. Statement of Purpose

The transmission of the electricity from the generation point to the locations of the consumers is called a Power System. A power system contains three major parts, including power generation, power transmission and distribution. The power transmission contributes more towards the losses which are dependent on resistance, inductance and capacitance, respectively. The performance of a transmission line is mainly dependent on the above mentioned factors. If a transmission line located at low height from ground, the capacitance effects are more and hence the performance is lowered and vice versa. Consequently, a transmission line is connected in a curve shape or catenary, named as the sag. Sag is used to reduce the tension. Sag and tension must optimally be adjusted. This study gives a mechanism to compute sag and tension of All Aluminum Alloy Conductor (AAAC) overhead transmission line for manifold spans with effect weathers.

2. Introduction and Background

A system that transmits the electricity from generation point to end user is called a Transmission System (TS). Transmission lines (T/L) and sub-stations are vital in TS [1]. The lines transmitting the electricity are one of the important parts of power transmission networks. Hence, suitable designing of T/L is among the vital issues required in designing and implementing a transmission system. The successful performance of transmission system mainly dependent on transmission modeling implemented in a power transmission system [2]. T/lines are always connected in form of curves, called catenary, between the helpful towers. The sag provides a T/L to reduce tension in a transmission system [3]. But, there exists a contrary connection between the sag and tension. For a high tension transmission line, we observe a little sag; however, the there exists a fair chance of transmission line damage. Similarly, for high sag, an excellent degree conductor is used that obviously increases the cost of a system. The sag intensity is dependent on the separation in two towers. Larger distance creates greater sag [4]. The sag-tension calculations in the transmission system are aim at fixing appropriates limits between sag and tension to continue uninterrupted power supply to the consumers. The sag-tension calculation allows calculating the conductor temperature as well as ice and wind load simultaneously [5]. The tension is keep within limits by the tension limit of the towers and conductor. While clearance distance of sag depends on ground and line crossings. In case the crossing distance is less than the clearance distance, there will be chances of occurring line faults [6]. The quantity of insulator strings and there installation techniques in that “V” or “I” configuration can be set are also important for calculation of sag-tension. The insulator string by its nature possesses characteristics of element therefore being element contributes in adding up further sag caused by conductor itself [1].

3. Significance

While designing overhead lines, care needs to be taken so that the sag is adjusted in such a way, that tension running in the conductors is within safe range. In fact, tension is managed via conductor weight, temperature variation, ice load over wire and the effects of wind. Reference to normal practice, conductor tension is keep below 50% of its eventual tensile power. This implies slightest safety factor of a conductor tension requires twice. At this instant computation of sag

and tension of a conductor will be carry out keeping level of support at equal. A conductor is considering between two supports A and B of equi-level with O as the lowest point. We can prove that lowest point prevails at the mid-span. Consider a point P on the conductor. Taking the lowest point O as the origin and let the co-ordinates of point P be x and y. Assuming that the curvature is so small that curved length is equal to its horizontal projection (OP = x). Practically the sag is measured between two level supports, which include the weight, length and tension between every two supports. That is between every two supports these terms should be find mechanically and mathematically. The need of low cost simulation setup to find sag and Tension is necessary.

4. Methodology:

In order to obtain result based sag-tension, the sag-tension of AAAC T/L is considered for various equi-span lengths of different operating conditions will be analyzed. The measuring tool that will be used in calculations is termed as the ETAP. This module contains an analytical strength for T/Ls and distribution Lines Sag and Tension computations. This is a freely obtainable and low cost simulations based software to compute the sags and tensions to guarantee appropriate operating conditions on the overhead transmission lines. Four cases will be used in this study. In case-1 sag-tension of AAAC in lowest operating situation having no wind consequences will be analyzed since during winters the temperature is low. In case 2, temperature is increased from minimum to normal temperature and calculate sag and tension of AAAC. In case 3 the temperature is at maximum because in summers the temperature reaches to its peak value and then calculated sag and tension under maximum temperature. In case 4 a worst condition i.e. Maximum temperature with maximum wind effect and checked its effect on sag and tension. Such computations will be for level spans when towers will be of same height. The height of tower is 16m and spacing between conductors is 1.5m. The conductors used in the research will be AAAC (All Aluminum Alloy Conductor) because:

- They provide good strength and composed of the Aluminum-Magnesium-Silicon alloy and give improved strength to weight ratio by permitting conductors to demonstrate further resourceful electric characteristics.
- Such conductors also show exceptional sag-tension uniqueness.
- Moreover, show better corrosion resistance as compare to other conductors.
- Comparing with traditional ACSR, AAAC are lighter in weight, are having lower electrical losses and comparable strength and current carrying capacity.

5. Conclusion

Consider for sag-tension estimation of AAAC overhead conductor in transmission lines. The various span lengths considered under different operating conditions. For these conditions, the height of tower was same but operating conditions of temperature are different. The following conclusions can be drawn on the basis of study:

- In winters, the temperature is minimum so due to low temperature the AAAC line contracts as a result there will be low sag that will indicate a high tension, so it is clear

from our result of case 1 when the temperature is low there is low sag and that indicates high tension.

- In spring, the temperature is normal so the sag of AAAC line will be high than winters and there will be less tension than previous case. In summers, the temperature is maximum so due to increase in temperature the metallic body of conductor expands as a result the weight of conductor increases so sag is also increased. Therefore, it is clear from our results that in this case there is maximum sag and minimum tension.
- In case 4 worst condition i.e., both maximum temperature and maximum wind effect at a same time is consider. Because wind will increase apparent weight of the conductor, as a result increase in tension and due to maximum temperature there will be maximum sag.

From the conclusions, it is clear that due to wind effect there is increase in tension occur. Therefore, for the sag estimation of overhead conductor ETAP software is very helpful to predict sag-tension behavior of overhead conductor in transmission line more efficiently, moreover it is easily available software as compared to high cost commercial software to calculate sag-tension.

References

[1]. Quintana J, Garza V, and Zamudio C (2016). Sag-tension calculation program for power substations. In the 42nd Annual Conference of the IEEE Industrial Electronics Society, IEEE, Florence, Italy:

[2]. Taleb M, Ditto MJ, and Bouthiba T (2006). Performance of short transmission lines models. In the IEEE GCC Conference (GCC), IEEE, Manama, Bahrain: 1-7. https://doi.org/10.1109/IEEEGCC.2006.5686249

[3]. Oluwajobi FI, Ale OS, and Ariyanninuola A (2012). Effect of sag on transmission line. Journal of Emerging Trends in Engineering and Applied Sciences (JETEAS), 3(4): 627-630.

[4]. Seppa TO (1993). A practical approach for increasing the thermal capabilities of transmission lines. IEEE Transactions on Power Delivery, 8(3): 1536-1550.

[5]. Mehta VK and Mehta R (2005). Principles power system. S. Chand Publisher, Ram Nagar, New Delhi, India.

Question # 03:

According to the Concise Oxford Dictionary, Plagiarism is defined as: taking and using the thoughts, writings, and inventions of another person as one's own. This, or various similar definitions found in recognized publications / documents, are very broad and can be used to create awareness about Plagiarism but are not practical enough to apply in order to ascertain guilt or innocence in specific cases. In order to establish the violation of ethical norms, or academic or intellectual dishonesty resulting from Plagiarism and to take punitive actions in this regard, it is necessary that the variety of forms in which Plagiarism manifests itself are known. According to HEC, these include but are not limited to the following:

- Verbatim copying, near-verbatim copying, or purposely paraphrasing portions of another author's paper or unpublished report without citing the exact reference.
- Copying elements of another author's paper, such as equations or illustrations that are not common knowledge, or copying or purposely paraphrasing sentences without citing the source.
- Verbatim copying portions of another author's paper or from reports by citing but not clearly differentiating what text has been copied (e.g. not applying quotation marks correctly) and /or not citing the source correctly.
- The unacknowledged use of computer programs, mathematical / computer models / algorithms, computer software in all forms, macros, spreadsheets, web pages, databases, mathematical deviations and calculations, designs / models / displays of any sort, diagrams, graphs, tables, drawings, works of art of any sort, fine art pieces or artifacts, digital images, computer-aided design drawings, GIS files, photographs, maps, music / composition of any sort, posters, presentations and tracing.
- Self-plagiarism that is, the verbatim or near-verbatim re-use of significant portions of one's own copyrighted work without citing the original source.
- Wikipedia also describes Self-plagiarism as "the re-use of significant, identical, or nearly identical portions of one's own work without acknowledging that one is doing so or without citing the original work. Typically, high public-interest texts are not a subject of self-plagiarism; however, the authors should not violate copyright where applicable. "Public-interest texts" include such material as social, professional, and cultural opinions usually published in newspapers and magazines."

Question #04:

The impact factor (IF) or journal impact factor (JIF) of an academic journal is a scientometric index that reflects the yearly average number of citations that articles published in the last two years in a given journal received. It is frequently used as a proxy for the relative importance of a journal within its field; journals with higher impact factors are often deemed to be more important than those with lower ones.

According to HEC policy:

A Journal is eligible to be considered for positioning in HJRS if and only if it: (1) is indexed by Thomson Web of Science or an index (including Scopus) that is recognized by HEC from time to time; and (2) has been assigned an Impact Factor by the indexing agency. HJRS is a relative threshold-based system that assigns W, X and Y categories to Journals; W being the highest and Y being the lowest. Since thresholds are relative; therefore, it is important for authors to know the predictive assessment of any W Category Journal being downgraded to X or Y categories at any time in the future. Similarly, the predictive assessment of any X or Y category journal being promoted to W category at time in the future. The purpose of Medallion is to provide that predictive assessment based on the distance from the relative threshold selected for W Category in a given year. The following are descriptions of different Medallions:

i. **Platinum:** The Journals with *Platinum Medallion* have nearly negligible probability of losing "W" Category at any time in the future

ii. **Gold:** The Journals with *Gold Medallion* have very low probability of losing "W" Category at any time in the near future.

iii. **Silver:** The Journals with *Silver Medallion* have low probability of losing "W" Category at any time in the near future.

iv. **Bronze:** The Journals with *Bronze Medallion* are at a significant risk of losing "W" Category at any time in the future. It means these journals are very close to the relative threshold chosen for the "W" Category.

v. **Honorable Mention:** The Journals with *Honorable Mention Medallion* have low probability of being promoted to "W" Category at any time in the near future. It means these journals are also close to the relative threshold chosen for "W" Category.

vi. **Clay:** The Journals with *Clay Medallion* have very low probability of being promoted to "W" Category at any time in the future.

vii. **Null:** The Journals with *Null Medallion* have negligible probability of being promoted to "W" Category at any time in the future.

The authors, therefore, might find Medallion information significantly helpful in making an informed judgment to select a journal for their publication.