Under Ground Cable Fault Detection & Distance

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Abstract— The cable (electrical) runs underground¬ instead of overhead lines. In electrical cables when the fault occurs in underground it's very hard to find the exact location of the fault process of particular repairing area in cable. From now there is a lot of ideas have been implemented to find the fault in cable wire. Our proposed system detects the exact location in the cable and with the help of Wireless-Fidelity it's serially communicated towards web page in base station. Till now the problem occurs in underground cables are big problem till now. The average error in absolute locating incipient faults of underground cables are 7.37%, 3.65% and 4.67% respectively. But it's very difficult to find the faulty location or exact location manually. When losses occurred in wire, they suddenly affect the efficiency of the cable. But the task is to find or detect the fault in underground cable. In order to fill those gaps, we proposed a system which detects an exact location of the fault and notifies through the means of Wireless-Fidelity module it's serially communicated towards the server.

Keywords: Wireless-Fidelity Module, Fault Detection

I. INTRODUCTION

The usage of underground cables is increased and they have been assembled by enhance techniques and exact location of the faults have been take placed. Underground cables are implemented widely due to the environmental concerns and reliability. In distribution system to improve the reliability to improve the interruption time during fault. Consideration of analysis in border aspects to locating a faulted segment of underground cable system. Faults in underground cables have been classified into two categories are incipient faults and permanent faults. Basically, the incipient faults in the electrical cables are due to aging process. Eventually the incipient faults fail into permanent faults sooner or later. The analysis of locating the fault segment of underground cables contains larger broader aspects and considerations. There is not an accurate algorithm to find or locate a permanent fault in underground cables is crucially for utility for companies to minimize the time.

II. RELATED WORK

Xia Yang et al.(2008) proposed a fault location for underground power cable using distributed parameter approach by certain boundary conditions and equivalent circuit model .Due to the method adopted on the shields in multiple point with help of applying current and voltage equations .Their analysis gives the foundation for develop a multi -section model for fault location in cables.

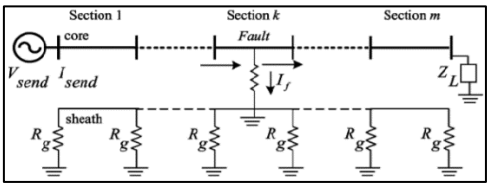

Fig. 1:

Zhihan Xu et al. (2011) Concerned fault location based on single end measurements for underground cables by the model of a typical MV XLPE cable models they were used in an Electromagnetic Transients program (EMTP).worked with an algorithm for core- sheath-ground fault locate at the single -phase core -sheath -ground fault and the effect of changes of cable parameters .

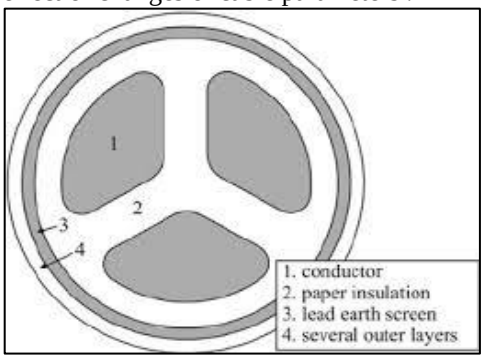

Fig. 2: XLPE Cable

Saurabh Kulkarni et al. (2014) has characterized a cable failure by a series in single – phase sub -cycle with incipient faults had been included with arc voltage based fault location algorithm applicable for single line to ground faults which incorporates a pre-processing of input data for a validation using arching fault detection on distribution feeders for incipient faults.

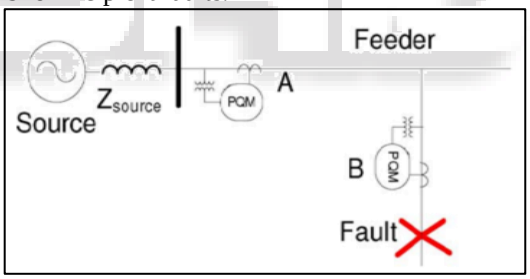

Fig. 3: Faulted Distribution Feeder with Monitor Locations

Hanif Livani et al. (2012) applied a design a single ended and hybrid ravelling wave-based fault location for power transmission. With support vector classifier fundamentals and fault section identifier by SVM and DWT. They achieved the performance through MATLAB with various sceneries of travelling waves.

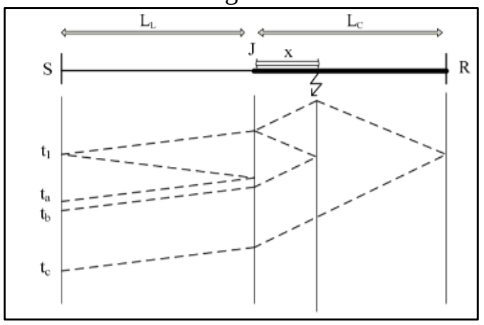

Fig. 4: Bewley Diagram for a Fault in the Underground Cable

Mahmoud Gilany et al. (2007) project a system of travelling wave-based fault location scheme for multi-end aged underground cable system by the model decomposition of cable. The fault occurs in aged cable are found through algorithm of halves of the cable their proposed system sound by discriminaton between transient signals determined using ATP/EMTP in voltage signals of both ends of each cable.

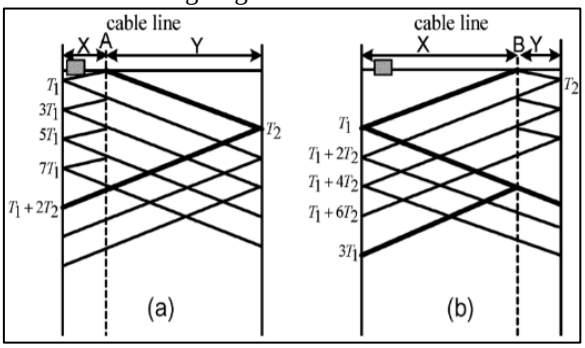

Fig. 5: Bewley lattice Diagram for a fault at (a) first half section of the line (at A) and (b) Second half Section of the line (at B)

W.Zaho et al .(2000) advised a system on wavelet analysis based scheme for fault detection and classification in underground power cable systems by using a discrete wavelet transform on 400 kV in underground cable simulated by ATP/EMTP using fault transients and classification schemes.

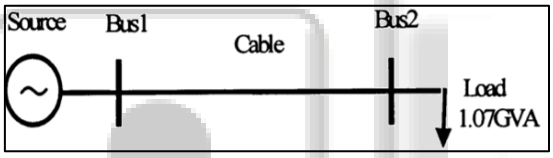

Fig. 6: Configuration of a 400 kV Cable System

W.Zhao et al .(2001) done an improved GPS travelling wave fault locator for cables by using wavelet analysis by synchronized sampling technique and travelling wave principle for underground cable system by alternative transient program (ATP).The implementation and evaluation done through digital simulation studies , transient analysis and algorithm description with performance evaluation.

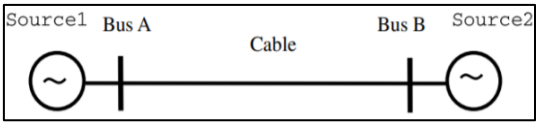

Fig. 7: Configuration of a 400 kV Cable System

E.C.Bascom et al. (2000) has implemented (PTI) power technologies developed at expert system and on-line advisor to find a techniques in finding a fault in a cable had expanded and implemented with certain methods and experiment and explained the types of faults like open conductor fault, shorted fault, high implemented fault and locating methods are hillborn loop, murray loop and murray loop for two-ends.

Mukhtiar Ahmed Mahar (2017) projected a design and fabrication of underground fault distance locator using Arduino and GSM and they implemented a Arduino UNO board and GSM technology with certain simulations and the steps of algorithm and they done with step down transformer ,Regulator IC , relay , GSM module and their simulations shows the measured voltages, current and fault location.

D.Rama Krishna (2017) done a underground cable fault detection with the help of LCD, buzzer, Arduino kit by the fault like open circuit and short circuit faults and they displays some methods are Time domain multidisciplinary, Murray loop test and ohm's law with different cable faults and their proposed give some advantages like low cost, low complexity, low maintenance & long distance applications.

Kiran Wadekar (2018) concerned an IoT underground cable fault detection their paper shows a fault location of underground cable by using microcontroller and transfers the data through the internet access. They conclude their project with simplified actual problem of fault in underground area by discover the position of the fault by accurate break point. And they project their proposed system with uses the simple concept of OHMs law where a low DC voltage is applied at the feeder end through a series resistor.

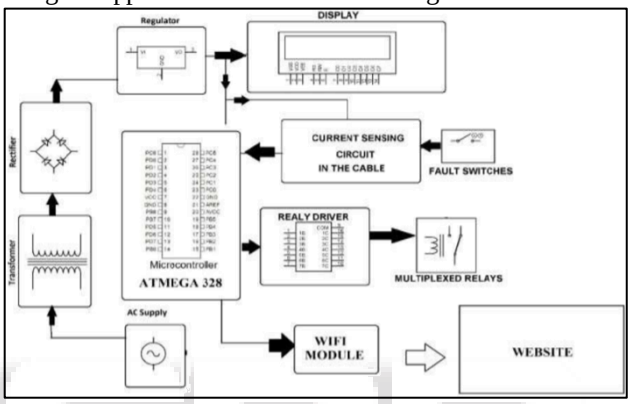

Fig. 8:

AUTHOR	IMPLEMENTED WORK	REMARKS
Xia Yang et al. (2008)	Boundary conditions- Sequence, phase network, Determining fault distance	such values can be inaccurate improvement on acquiring measurements will be taken into the account of noise
Zhihan Xu et al. (2011)	By using algorithm for fault location are core- ground fault, core-sheath fault, sheath current in faulty cable	The simulation demonstrates such algorithm even though there is a error increase for the cases with special fault conditions
Saurabh Kulkarni et al. (2014)	Time domain analysis, fault diagnosis	The absolute error in underground cables failures are 7.37%,4.69%,3.58%
Hanif Livani et al. (2012)	Proposed by hybrid method like discrete wavelet transform (DWT) And (SVM) used for identify the section of the fault	They used only two types fault distance identification and they are not more efficient
Mahmoud Gilany et al. (2007)	Wavelet transform, Modal decomposition, electromagnetic	If the cable gets aged the fault locating algorithm can't be implemented

	transients' program	
W. Zaho et al. (2000)	Wavelet analysis, ATP/EMTP, transient analysis	They are not capable for wide range of system and fault conditions and they are in still investigation
W. Zhao et al. (2001)	Wavelet analysis, Global positioning system, Alternative transient program.	They can use only for 400Kv
E.C. Bascom et al. (2000)	Fault location methods: Hill born, Murray, Murray loop two-end	It can't be implemented because they proposed only ideas (different types of methods)

Table 1:

III. Result & discussion

The different strategies and results are compared by tabulating with the implementation details, advantages and disadvantages of each research work as shown in above table.

IV. Conclusion

The survey shown in the table helps in identifying the existing underground cable fault detection and distance locator. To identify the faulted segment of underground cable systems based on distributed parameter circuits. The efficacy of the proposed algorithm was extensively evaluated using real world data. They used to be very power full to detect the arrival time of travelling waves generated by faults in underground cable system. Future work will extend the proposed location algorithms into underground distribution networks with laterals and tapped loads. For this we use simple concept of OHM's law so fault can be easily detected and repaired.

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