iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** III **Month of publication:** March 2021

DOI: https://doi.org/10.22214/ijraset.2021.33170

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue III Mar 2021- Available at www.ijraset.com

Review Paper on Future Distribution Feeder Protection using Directional Overcurrent Elements

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Abstracts: ***Distribution feeder protection is very important part of the power system .Because of feeders problem whole distribution of power system can be in darkness of power supply that's why there is a so much necessary of directional overcurrent elements. Ex.Directional overcurrent relay different .types of load connected with the distribution system through the feeder to sustain power system in a such types of power system .Directional overcurrent relay must be fixed in a different mode of power supply. Non directional overcurrent protection might be provide protection as well as security because faults on remote points of the circuit. That's why Directional over current relay using as a secured and sensitivity element . While faults duration relay will be tripped and also with forward and reverse faults created in a distribution system.***
Index Term: Revers faults forward faults feeder protection power distribution protection Directional Overcurrent relays Power System (DOCRS).

I. INTRODUCTION

In this paper introducing about the distribution protection system. It is must for the directional faults reasons understanding .Which type faults occurs in a system .It might be faults of rising a forward current .Here directional overcurrent relay must be used ,according its ampacity and voltage level .Load increment terms is so much important while defining the faults reasons.it is very easy to solving maintaining Replacing the Elements in feeder protection system.

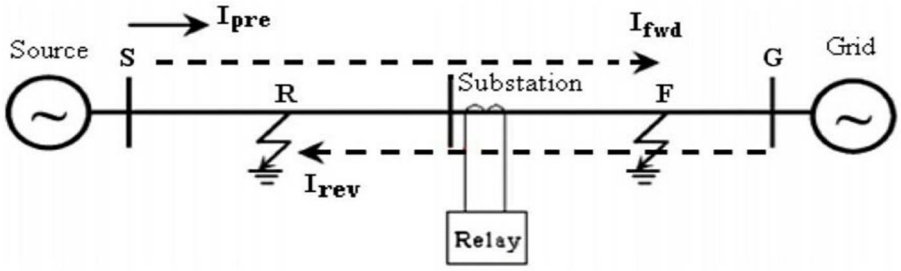

Fig 1. overcurrent : forward (F) and reverse (R) fault.

If the faults in both direction e.g. Receiving end power system that is why between both system is connected with a directional overcurrent elements. It is benefit for the protection feeder . controlling on voltage swing .Voltage swell .and unity will be proper in future feeder protection system and power future of distribution system can be maintained .Its power system so much properly working and it will be secured.

II. PRESENT AND FUTURE DISTRIBUTION FEEDER CHARACTERISTICS

In a feeder protection system cannot be secured by only one direction of faults but it should be in Bi-directional protection .Eg. forward current faults protection Revers faults protection while protection of feeder system it is considering a present and future feeder characteristics.

it is reason for the load encroachment .It means that ,future expansion of distribution feeder protection while considering the present distribution feeder system .Neither it will be harmful to feeder system protection and hazards for the distribution power system.

Present and future feeder characteristics in balance voltage and current level then distribution feeder system might be in balance three phase system. feeder characteristics must be balance at any time of power supply present and future neither it is the part of hazards for the power system.

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III. DIRECTIONAL OVERCURRENT RELAYS PROTECTION

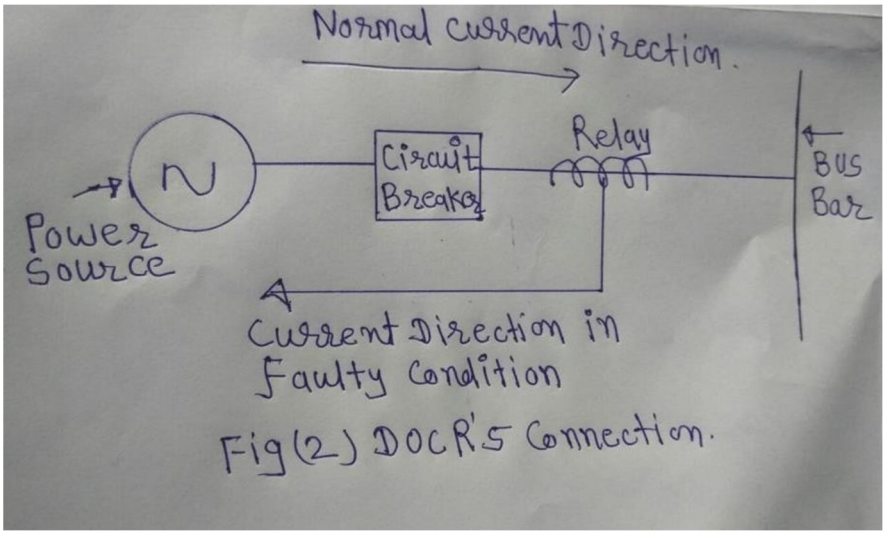

Fig.2 DOCR'S Connection

Fig (2)in feeder protection how's the week of relay working in feeder or service main system in this figure shows the direction of normal current and with the current direction in faulty condition .it will work as a tripping device and continuation of power supply.

1) *Normal Current:* It is also called as forward current direction and current direction in faulty also called the reverse direction of current .(Reverse Current, Forward Current)
2) *Forward Current:* It is the normal current state but the current will be increased as well as the level of voltage .It's a part of Ferranti and Directional overcurrent relay will be tripped it.
3) *Reverse Current:* In a power system feeder current goes to the reverse direction .It means that reverse power flows then DOCR'S tripped the circuit because of reverse power flow direction

IV. LESSONS LEARNED FROM DIRECTIONAL OVERCURRENT MIS- OPERATIONS:

The directional overcurrent relay commonly used in distribution feeder protection system but in that's mis-operation of directional overcurrent is going .According to Region wise operation, it seen in figure2,3and fig (4). The Relays directional elements sense positive sequence impedance z1 and making a comparison with the line impedance angle z1< at more than 900.

Its current defined in reverse in more application the line impedance angle making a good benchmark for the reverse /forward fault current.

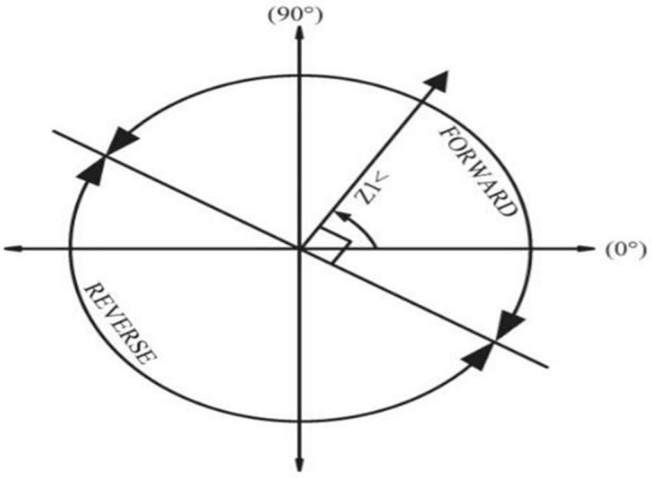

Fig .3 phase directional element impedence diagram .

In fig .3 ,it can shows the relays phase directional element in z1<.it may be in bi directional reverse current and forward current .

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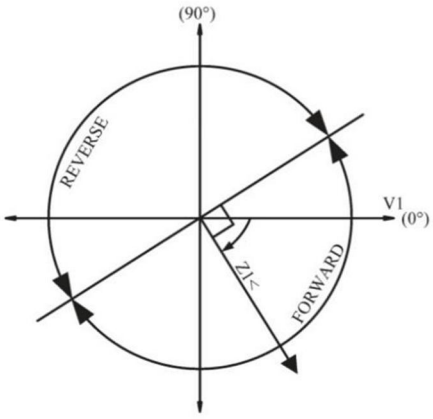

Fig. 4 phase directional element I1 and V1

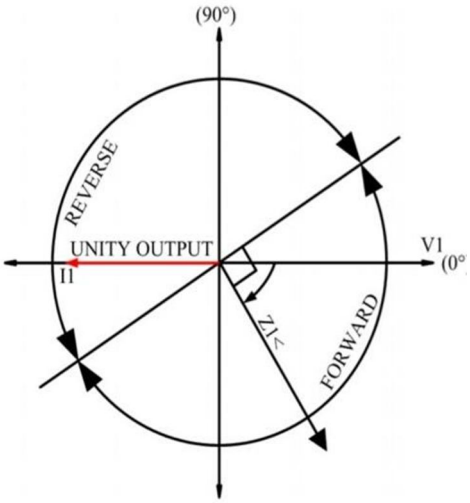

Figure 5 unity pf output on a collector at 180.

A common distribution feeder relays is applied for collector protection and not apply for current flowing out of the collector. Decreasing the z1 <fixed permissions add VAR power flow from the collector.

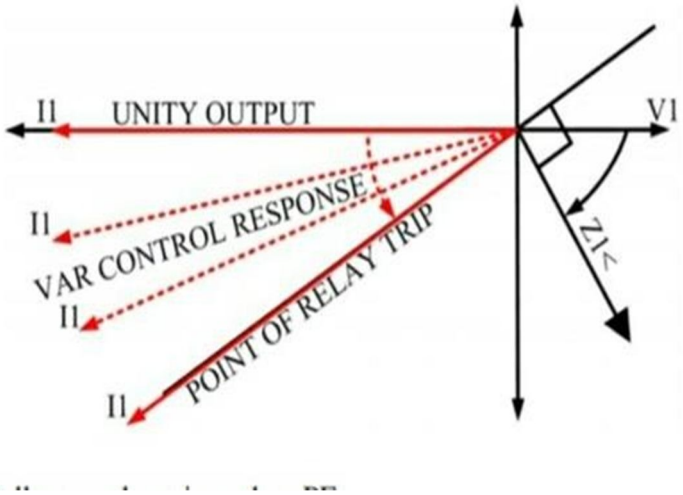

Figure 6. Collector Relay trip on low P.F.

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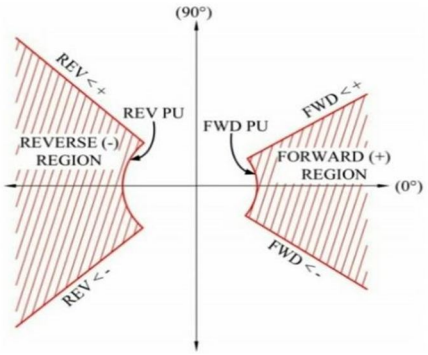

Fig.7. Typical Load Encroachment Impedance Diagram.

In fig (7), It can shows ,two important part of the encroachment ,first is the reverse region and second is the forward region ,Rev<+, z1<+, impedance, positive and negative impedance in reverse region of the relay and z1<+,z1<- for the forward per unit impedance in a forward region .its relay needs to to secure a system in forward current power systems unity. The directional overcurrent element is designed overcurrent element is designed to provide flexible regions in the forward and reverse direction independently in fig.8.

In fig 8 the fixing range permits to settling positive and negative angles at the reverse region to go 90 Degree and 270 degree. According to full block the whole output region rev<+90 degree. And rev <=270 degree. Its shows a positive angle for the forward region at 90 degree. (FWD <+90 Degree. And negative angle for the forward region. It shows generating region blocked and forward region at 90 degree. And negative angle for the forward region to 85 degree. fwd<-=85.

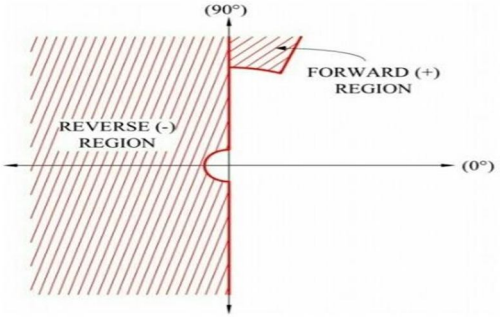

Fig. 8 Load encroachment diagram secure collector directional control.

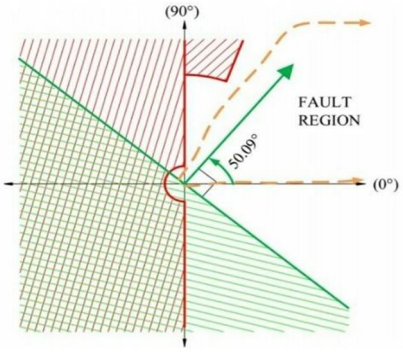

Fig.(9) Aggregate directional control for directional overcurrent element Impedence diagram.

Forward load pick up (FWD P.U.) IS the fix to the max . set to prevention the block of any forward fault. The reverse load set (rev p.u.)is fix to 120 percent of the maximum capacity of generation collector circuit. All fault lies in 0 and 85 degree fig 10. And here Normal region can be said to forward region (+).

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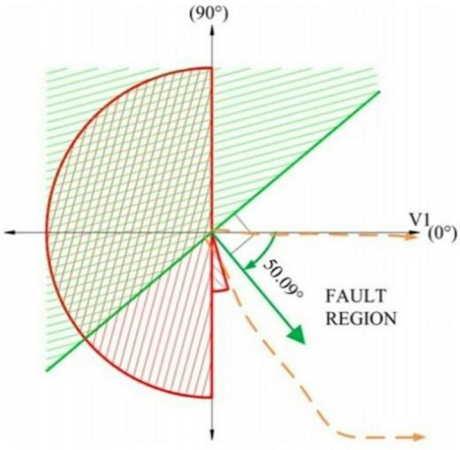
V. SECURING HIGH PENETRATION FEEDER PROTECTION



Fig,10. Aggregate direction control for directional overcurrent element V1 Reference.

Fig.10. IT can represents the directional overcurrent elements (Relay) supervision referenced to the positive sequence voltage v1.the distribution substation and feeder canready to carrying the maximum distribution load.

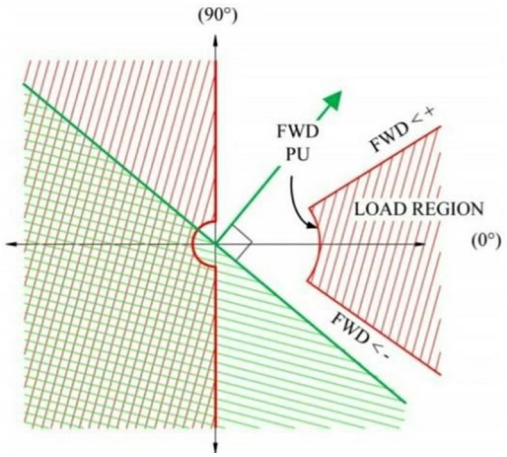


Fig.11 Feeder aggregate directional control for directional overcurrent element impedance diagram.

The apparent z1 impedance can be seen by the feeders connected relay is explained by the load region to cancel this place keeping overcurrent relay safe with higher load flow that with lost of sensitivity to higher resistive faults . if the resistive load not a high . then the practically effect on faults sensitivity is nothing in the duration of security is most important. directional overcurrent relay protection for all faults is not effected.

When care of the feeder fixed angle set points in forward . the forward account possible power factor for heavy forward load.in the substation feeders circuit breaker . as well as maximum VAR Exchanges as a commitment in volt /VAR Controlled practical by the distribution feeder resources. preparing maximum current flow. that will be more effect on VAR Abilities than specified values but its unable to exceed the max MVA Rating of the feeder unit .there is most mention to the “FWD<+ setting is very difficult on fault defining performances .the forward <-,able to same be fixed to 270 degree with same effect on protection of distribution feeder protection.

VI. CONCLUSION

A Directional overcurrent relay is a susceptible element in a distribution feeder protection system in a load increased condition can be secured from the higher forward current as well as reverse forward current . a directional element can be sense a current of bi directional in power system. It will be effectively work in feeder protection also with secured sensitivity and properly region wise operate a directional overcurrent relay.

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Future distribution feeders will be connected with the number of electrical appliances that's why there will be a creating region wise fault (forward reverse), FWD<+, FWD<- Fault, Rev <-,Rev <+), DOCRS Save the feeders fault from this situation .

To studying for the distribution feeder protection and secured power distribution system can be developed with directional overcurrent relay .while duration of fault relay will tripped the duration of the faults relay will tripped the power distribution system.

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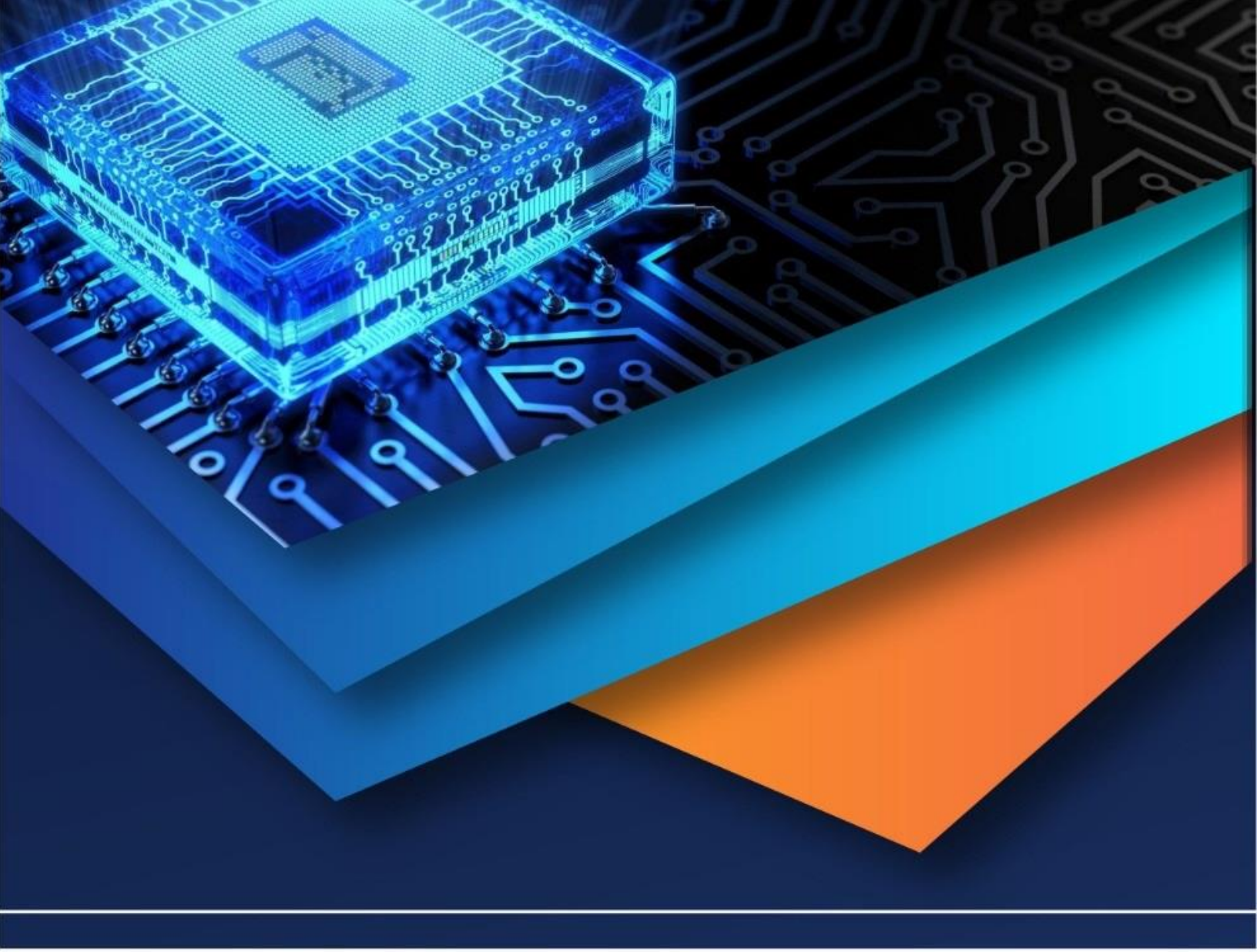

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