DIRECTIONAL ELEMENT USED IN FEEDER PROTECTION

[1] Mr. Mangesh R. Pande, [2]Mr. Harshal V. Takpire
PG Student M. Tech 4th Semester, Department of Electrical Engineering, G. H. Raisoni University Amravati, Maharashtra, India[1], Assistant Professor, Department of Electrical Engineering, G.H.Raisoni University Amravati, Mh., India[2]
mangeshpande.mp@gmail.com[1] , harshal.takpire@raisoni.net[2]

ABSTRACT

In this paper directional element is a directional overcurrent relay. The overcurrent relay are play a important role in a power system. The overcurrent relay are used in power system. It is also used in sub divided system of the power system. It might be used in transmission side and non directional for distribution. Both side of transmission ass well as distribution consist with a directional over-current relay. The fault occurred may be a forward or reverse. The fault direction' are depend upon the sending end of the power system. or receiving end of the system. Voltages and current sensor's coil are in buid in directional overcurrent relay. Voltage sensor can sense the circuit breaker and current sensor sense the overcurrent in Ampere and trip the circuit instantly. Protection and automation is the major part of the power system. It may in case of distribution grid system. By the directional overcurrent relay, power systems problem can be resolve in the situation of fault current / voltage and fault direction can be easily detect. The power system ,(source , or grid side) , must be protect by the using a directional over-current relay. Fault direction defining is possible.

Keywords: Protection and automation , directional over-current relay , protection, over-voltages,fault direction , inverse definite minimum time (I.D.M.T.),definite minimum time(D.M.T.).

I. INTRODUCTION

In this paper specially focused on the current direction aand with over current , voltage.and its values are inbuid specified in a directional overcurrent relay. Polarization of flowing a current is so much important for sensing the current fault direction in distribution / grid power system. The directional overcurrent relays are adequately used in power transmission system. Purpose of protection distribution protection can be used a non-directional relays. So it means that, that is a commonly issues of overcurrent. The non-directional relay monitering the overcurrent from the specified value in a power system of transmission.so, there is a set value a defined time to beginning the definite minimum time (D.M.T. To defining a difference in current and time by the overcurrent relay. It is governed by the I.E.C. (The international electro-technical commission) standards. Depending upon the various overcurrent (peak value of the current) and its magnitude and time duration for non-directional relays. Forward path relay and line connected with each other for sensing the current magnitude as it is same for the reverse path relay and line combined connection in over-currents relay.

Means that polarization voltage is used commonly for direction of faults. If the faults occurred in a power system then waveform of current is showing a disturbances.

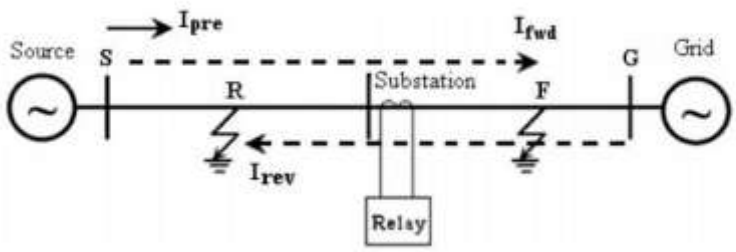

Figure 1 – overcurrent relay :- forward and reverse fault.

Determined the fault direction by seeing a phasor of current opposite the basic reference value of voltages. The necessity measurement of current and voltage . It can be match the voltage and current error.in a overcurrent relays display. The transmission grid's protection is expensive. Because of automation for making the smart grid. The fault zone defined by the almost grounded. It is almost close proximity to the relay. The measurement of power system in case of voltage, current, impedance are the very significant. It is live test for the short circuit test and A] principle of current-only directional detection **:** system. Thats why protection of transmission /grid lines is important factor for safety and precaution purposes.

II. THE DETECTION OF CURRENT -ONLY DIRECTIONAL

A] PRINCIPLE OF CURRENT-ONLY DIRECTIONAL DETECTION :

Above figure-1 shows the forward and reverse path for current flowing region. In this figure shows a source to grid connected power system. If the reverse current is flowing in power transmission system grid to fault current location(R) is

Irev =vg/zgr ……(1)

Irev-reverse current

Vg-grid voltage

Vgr-line/feeder impedance

In case of forward fault current i.e. Ifwd=vs/zsf

Ifwd= vs/zsf …….(2)

Ifwd = forward fault current

Vg = voltages at grid

Zsf= line impedance

Zgr and zsf are commonly negligible resistance and capacitive.

Now , Ipre =(vs=vg)/zsg is the pre-fault current from the source power system the total post-fault current IR is sensed by directional overcurrent relay in case of the reverse fault current(IR) and reverse resistance is (Rr).

IR= Ipre =Irev-vg/vzr

Same by (i-v/r)

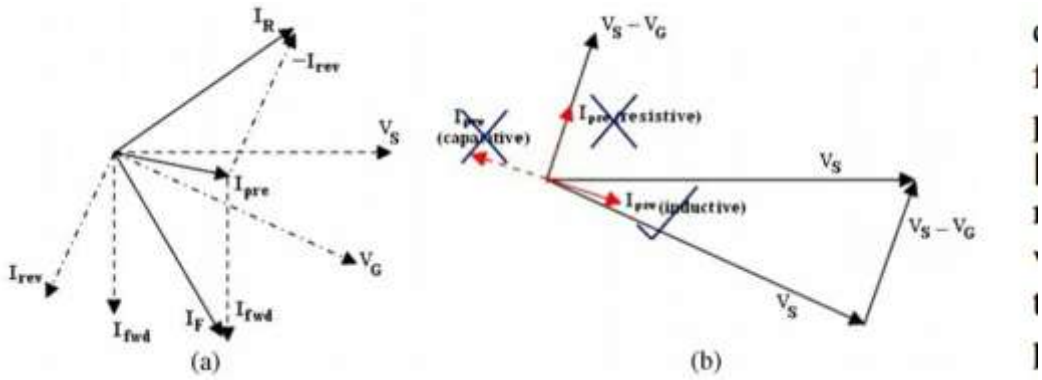

Figure2 Phasor diagram for (a) reverse and forward fault and (b) pre-fault current.

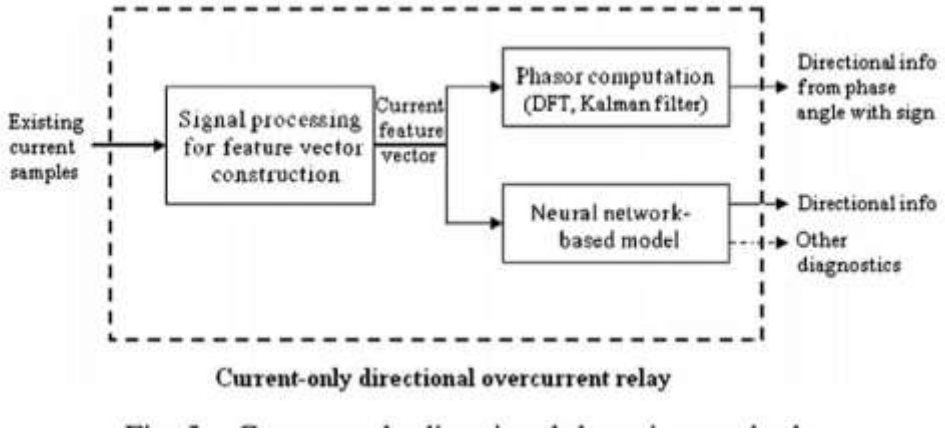

Figure 3 Current-only directional detection methods.

Here, similarly, the total post-fault current. If(sensed by the relay)in case of forward fault (f) is IF= Ipre+Ifwd= Ipre+vs/zsf…….(4)

Respectively values of if and ir is totally different from each other. If can get the value of current in positive and Ir can have get the value of current in negative.so the single difference will be between If and Ir current in positive and Ir carn have get value of current in negative. So the single difference will be between If and Ir current. (IF=forward current, IR= Reverse current) and phasor diagram of current will be differ in case of forward and reverse current fault. It is able to define the direction of the post-fault current with respect to source current phasor is change because of direction of fault current in forward as well as negative on figure(2) shows a the short circuit current phasors. Irev and Ifwd. Because of the jumping of current phasor and figure(b). Shows the grid to source voltages differ from each other.in case of the inductive line and it's power is lagging current phasor.

B] DETECTION METHOD

Above figure3 Explained the overall current sampling in power system by current by current only direction detection method. there is a input of current transform to the purpose of sample currents and sense the value is ifwd or Irs (If= forward current, Ir= reverse current) current transformer is a match the data of feature vectors. Just like a time domain. Examples of time domain average rectified samples and frequency domain examples are magnitude of current, magnitude of voltage phase angles which are get from discrete fourier transform.(D.F.T.). Wavelet transform is the basic significant for define the disturbances current. The feature vectors are utilized by the decision block to finding the direction. Generally under a normal condition in power transmission system doesent change in current phase angle and that with no chabges in polarization. If the fault current occurred in power system than the changed in a current phase angle. Estimation the current phase angle via. Discrete fourier transform, then each cycle(wave) is n , n+1, .D.F.T. shows the suitable value in positive then forward current is best for the under normal condition. And there is any disturbances in current and voltage waveforms.

III. LIMITATIONS OF CURRENT -ONLY DIRECTIONAL DETECTION:

(1) phasor angle calculation can be affected by the some factor just like frequency deviation, speed of electrical machines or unbalance three phase power system. It might be influenced by the realistic problem of overall the power system.

(2) sensitivity in phase angle this is also image limitation of current only directional detection. The minimum directional detection. The minimum angle of per angle of per cycle could be 360 degree /(100/50)=18 per sample. There must not be differ in per sample of the cycle.

(3) simultaneously some changes in sampling frequency so the power system is not going a normal condition.

(4) Accuracy of phasor angle is changes in the duration of fault (fault current) frequency disturbances spikes in current waveform.

(5)the imposing of pre-fault current can be disturbance the power system.

(6) pre-fault current has taking a certain duration and relays confirm that before the fault inception.

(7) relays always judge the information about the baseline and see a validation of pre-fault current.

(8) according to basic theory pre-fault current is with respect to estimated baseline magnitude of current voltage, current, impedances.

D. TACKLING OF HARMONICS NOISE

If the power system in under normal condition then it will be creating a low noise level. It is approaches to better power system. the useful approaches dealing with the noise by use of D.F.T. Base phase computation. Phasor computation considered a phase angle of the base frequency.(e.g.50 hz, 60 hz)basically this is a important for harmonic filter. If the power system is doubtful , then firstly relay check the differ frequency.

Any frequency is differ from the standard frequency, then the power system gives a some problem while run electrical machines and deviation in fundamental frequency. If the fault is major variance is long then relay sense the standard quantities and magnitude and trip the circuit breaker instantly. This is a frequency tackling method used by the discrete fourier transform. To keeping a sampling ratio of frequency is constant.

VI. CONCLUSION

In this paper , studied about the directional overcurrent relay. And detection method is used in the power system. Phasor computation is considered. phasor diagram can shown a all information about the forward and reverse fault current. In power system at normal condition it will create a low level noise . but it is considered as negligible. limitation of directional over-current relay is founded in power system. If the tracking method is used by the discrete fourier transform.

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