Review Analysis for AC-DC Power Transmission Extra High Voltage Line

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Abstract:
This paper presents the process of combined ac-dc power transmission system. In Transmission system when long extra high voltage (EHV) ac lines loaded till their thermal limits so very large amount of power loading results large instability occurs in transmission system which affects overall power system. We know that very difficult operation to load transmission lines to their valuable margin of thermal limits. In this method of proposed in our paper, it will be possible to load transmission lines at their maximum values of thermal limits. In this method transmission lines are allowed to transmit ac with dc supply superimposed on it. The conductors bear ac along with the dc supply. This implemented system gives conversion of ac transmission into composite parallel ac-dc transmission system thus having the advantage to transient ability, dynamic stability and damp out oscillation. In this paper the Simulation activity perform in MATLAB programming bundle having Simulink programming.

Keywords: EHVAC Transmission, EHVDC Transmission, Facts Power System Stability, Transmission Efficiency, Alternating Current and Direct Current Calculation, MATLAB, Simultaneous ac-dc power transmission.

I. INTRODUCTION

We know that whole world require the large amount of power with low loss because year by year the growth of all industries, commercial and residential part of the world demanding power for their growth. The demand of electric power having steady growth power is but the availability of power often not available at the increasing load centres and remote locations. On the environmental acceptability, and the economic concerns also giving the availability of energy are the factors which determining all these locations. Here because of stability considerations, the transmission having available energy through its existing ac lines having in upper limit. So it is very difficult to load long extra high voltage (EHV) ac lines to their thermal limits as given proper margin which kept against transient instability. The modern world having the situations that is full utilization of available energy which applying the new concepts to the old power transmission theory with a view the system availability and their security.

![Figure.1.Basic Circuit Diagram of AC-DC Power Transmission](image)

Figure.1.Basic Circuit Diagram of AC-DC Power Transmission
In the ac transmission system has based on the application of power electronic based technology which existing ac transmission scheme, the role of power electronics improves stability and efficiency to reach power transmission till its thermal limit. Here we are talking about Simultaneous ac–dc power transmission which was earlier proposed through a single circuit ac transmission line with uni-polar dc link with ground as return path was used for their transmission operation process. The Major limitations of ground as return path is due to the fact that the use of ground may corrode any metallic material if it comes in its path. The conductor voltage concerning ground Three winds up higher because of option of dc voltage on air conditioning line, subsequently more protector plates must be included with every separator string so it can withstand this expanded.

II. MODERN TRANSMISSION TRENDS

We know that the world require a large amount of energy of which electrical energy used by whole world. We have already consumed major portion of its natural resources like coal, fuels, petroleum and we are searching for inexhaustible sources like sun powered and wind vitality other than Hydro and Thermal to cook for the quick rate of utilization. It requires high voltages for transmission. They have roles to play and a country must make intelligent assessment of both in order to decide which is best suited for the country's economy. The high voltage ac transmission has the large amount of corona loss, skin effect and use of bundled conductor and compensation require for power transmission.

ADVANTAGES OF HVDC

1. Negligible corona loss.
2. No use of bundled conductors.
3. Negligible surface voltage gradient on conductors.
4. Negligible problem of Audible Noise, Radio
Interference, Carrier Interference, and TV Interference.
(5) High electrostatic field under the line.
(6) It prevents by Increased Short-Circuit currents and Possibility of Ferro resonance conditions.
(8) It does not require any compensation or use of any Capacitive circuit.

BASIC OF AC-DC POWER TRANSMISSION –

The basic scheme for simultaneous ac-dc power flow through a double circuit ac transmission line. Fig.2 shows the following network that carries both ac-dc powers simultaneously.

![Figure.2. Basic Scheme for composite AC-DC Transmission](image)

III. PROPOSED METHOD OF OPERATION

In these method we are using Line commutated 12-pulse rectifier bridge for HVDC and the dc power is connected to the neutral point of the zigzag transformer of sending end and we get the recovered back to ac again by using the line commutated 12-pulse bridge inverter on the receiving end side hence we get the both part of the power ac as well as dc on the receiving end side that means the same supply on sending end side the inverter bridge is also connected to the neutral of zigzag connected winding of the receiving end transformer to recover the dc current by using the inverter.

The dc current on the neutral point is dividing on all the three phases and then each conductor of each transmission line carries one third of the total dc current with ac current superimposed on transmission conductor. The division of current in all phases depends upon the resistance of conductor and then the value of dc current depends upon resistance of conductor Since the resistance is equal in all the three phases of secondary winding of zigzag transformer and the three conductors of the line, the dc current is divided in all the three phases.

The conductor of the second transmission line gives return way to the dc current to stream. If we are talking about the saturation of transformer then the saturation of transformer due to dc current can be removed by using zigzag connected winding at both ends of transformer. So the production of fluxes by the dc current (Id / 3) flowing through each winding of the core of a zigzag transformer gives equal magnitude and give opposite in direction and hence cancels. At any instant of time the total dc flux becomes zero. Thus, dc saturation of core is removed. Here higher value of reactor used to harmonics in dc current. In the absence of harmonics (3rd) or it’s multiple and zero sequence, under normal operating conditions, the ac current Flowing in each transmission line gets restricted between the zigzag connected windings and the conductors of the transmission line [9].

IV. SYSTEM PERFORMANCE UNDER FAULTY CONDITION

Under fault conditions the causation of sending side voltage and receiving side voltage suddenly dips of original wave form when fault is cleared. The causation and receiving finish currents rises to a precise spike then recovers step by step. Normally the voltage of across the rectifier and electrical converter dips on the prevalence of fault whereas this level spikes beneath fault conditions. The on top of results square measure obtained by employing a single line to ground fault within the distributed parameters for the one circuit line model. The results stay nearly similar beneath dc fault. Beneath fault conditions the reactive power demand will increase as is inferred from the graph. Because the reactive power is employed within the circuit thus the reactive power at the receiving finish aspect is lowered to a negative value. The one line circuit model uses ground as return path. Hence use of unipolar dc link for simultaneous ac-dc transmission can pose threats to the equipment located nearby in the ground since using ground as return path can corrode the metallic material if it is in its path.[7] Something else is that the laziness in the framework is evacuated, on the off chance that we consider an EHV line and on event of a blame the transient reaction of the framework for instance the voltage profile or the current or the sudden flood in the responsive power necessity has characteristic languor, the framework requires a long time to recuperate. But by using the simultaneous ac-dc model the transient response is increased and hence the transient stability. The stability is additional increased owing to faster current management mechanism of HVDC blocks that's the rectifier and electrical converter blocks. Within the management mechanism there's a master management and on an individual basis there's electrical converter and rectifier protection that works on VDCOL management procedures. Whenever the voltage dips on prevalence of a fault this is restricted therefore the fault current is additionally diminished and also the most vital factor is that it's terribly little time constant that's it works In time.

V. RESULTS

We see the simulation result for the simultaneous AC-DC power transmission the overall result for sending end voltages, receiving end voltages that shows the combined supply graph for AC with DC supply.

![Figure.3. Simulation model of HVDC Transmission](image)
VI. CONCLUSION

This paper has obviously shown the technique for displaying consistent state task of HVDC transmission framework rectifier utilizing all around accessible programming Matlab/Simulink. A straight forward plan of concurrent EHV air conditioning dc control transmission through a similar transmission line has been exhibited. Articulations of dynamic and responsive forces related with air conditioning and dc, conductor voltage level and aggregate power have been acquired for consistent state typical working condition. HVDC is the favoured framework for use in an assortment of transmission applications, utilizing submarine links, arrive links and overhead lines. The recreation works guarantee that concurrent air conditioning dc power can be moved in long inaccessible is conceivable staying away from warm farthest point and transient strength issue. The proposed power framework arrange is extremely basic and there is no physical adjustment in protector strings, towers and arresters of the first line.

VII. REFERENCES


