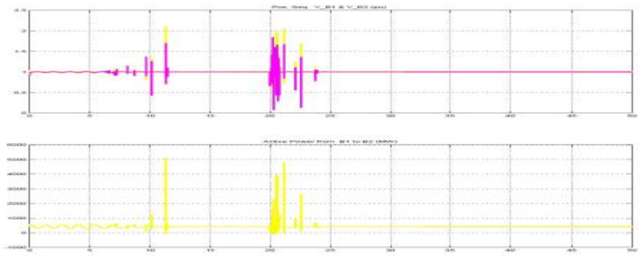

Figure 13. Under fault Condition power waveform with Pref. - Time [0 10]

Fault -Transition Time [20 20+6/50]

The MATLAB simulation result of the power system is shown in the figure given below. First taking the case when UPFC is connected in the system and fault is also there, system is going to unstable for a certain period of time. After fault clear from the system UPFC helps the system going to stable state. The following curves show the behavior of the system without UPFC. Fig 12 is acceleration power, fig. 13 show the power transfer from area B1 to area B2.

5. CONCLUSION

In this paper, an overview of transient stability analysis of two area power system is presented. At first a theoretical review of transient stability in two area power system without UPFC, considered study state condition and fault condition, which can be easily implemented in MATLAB is developed. Secondly, a theoretical review of enhancement of transient stability in two area power system with UPFC considered

1. Study state condition and 2. Fault Condition, Transient stability is intended for without change the syndromous Generator parameter and load.

A MATLAB simulink model for the enhancement of transient stability technique with both without UPFC and with UPFC is developed. In the simulation result for:

1. Test System without UPFC for large signal perturbation.
2. Test system with UPFC for large perturbation.

The simulation result are analyze and found that the result obtained from the test system is having large transient during large signal perturbation in case of without UPFC, therefore system goes into out of synchronism. In without UPFC two area system the system is unstable, when the gain of the excitation (Voltage Controller) in high (normal). Again the result obtained from the two area power system with UPFC is having improvement of transient stability during large signal perturbation therefore system stability & reliability increases.

REFERENCES

[1] Hingorani G, Gyugyi L. (2000). Understanding FACTS: concepts and topology of flexible transmission system. IEEE Press, New York.

[2] Kundur P. (1994). Power System Stability and Control. New York: McGraw Hill.

[3] Papic I, Zunko O, Povh D, Weinhold M. (1997). Basic control of unified power flow controller. IEEE Transactions on Power Systems 12(4). https://doi.org/10.1109/59.627884

[4] Papic I. (2000). Mathematical analysis of FACTS devices based on a voltage source converter- Part II. Electric Power System Research 56: 149-157. https://doi.org/10.1016/S0378-7796(00)00112-7

[5] Gyugyo L. (1992). Unified power flow control concept for flexible Ac Transmission systems. IEE proc. C 4(139): 323-331. https://doi.org/10.1049/ip-c.1992.0048

[6] Gyugyo CD, Williams SL, Rietman TR, Edris A, Schauder CD, Torgerson DR. (1995). The unified power flow controller: A new approach to power transmission control. IEE Trans on Power Delivery 10(4): 1085-1097. https://doi.org/10.1109/61.400878

[7] Nabavi Niaki A, lravani MR. (1996). Steady-state and dynamic models of Unified power flow controller (UPFC) for power system studies. IEEE Trans. on Power Systems 11(4): 1937-1943. https://doi.org/10.1109/59.544667

[8] Padiyar KR, Kulkarni AM. (1978). Control design and simulation of unified power flow controller. IEEE Transactions on Power Delivery 13(4): 1348-1354. https://doi.org/10.1109/61.714507

[9] Tambey N, Kothari ML. (2003). Damping of power system oscillations with unified power flow controller (UPFC). IEE Proc. – C 150(3): 129-140. https://doi.org/10.1049/ip-gtd:20030114

[10] Menniti D, Pinnarelli A, De Martinis U, Andreotti A. Modelling of Unified Power Flow Controller into Power Systems using P-Spice.

[11] Makombe T, Jenkins N. (1999). Investigation of a unified power flow controller. IEE proc.- C 146(4): 400-408. https://doi.org/10.1049/ip-gtd:19990037

[12] Papic I, Zunko P. (2003). UPFC converter-level control system using internally calculated system quantities foe decoupling. International Journal of Electrical power and Energy Systems 25: 667-675. https://doi.org/10.1016/s0142-0615(03)00025-5

[13] Canizares C, Uzunovic E, Reeve J. (2004). Transient stability and power flow models O the unified power flow controller for various control strategies" technical report #2004-09. University of Waterloo. E&CE, March 2004.

[14] Noroozian M, Angquist L, Ghandari M, Anderson G. (1997). Use of UPFC for optimal power flow control. IEEE Trans. On Power Delivery 12(4): 1629-1634. https://doi.org/10.1109/61.634183

[15] Mithlesh S. (2014). Fuzzy based simulation of D-STATCOM and DVR in power systems. AMSE Journals –2014-Series: Modelling A 87(2): 1-18.

APPENDIX-A

System Data:

Area (1) and area (2) are symmetrical areas

1. **Alternator:-** four alternators
   i. Nominal base- 900MVA
   ii. Nominal voltage- 20 kV
2. **Transformers:-**
   i. Nominal base- 900MVA
   ii. Nominal voltage- 20/230 kV
3. **Transmission lines:-**
   i. Short line (upto 25 kms)
   ii. Long line (more than 25 kms)
4. **UPFC:-**
   i. Nominal Ac voltage- 500 kV
   ii. Nominal DC voltage- 40 kV
   iii. Rated power- 100 MVA