

Before Compensation of Grid Current THD in %	After Compensation of Grid Current THD in %	
	ANFIS	ANN
AT TIME $t=0.5$ sec	$t=0.35$ sec	$t=0.35$ sec
i_a	19.88	3.19
i_b	24.49	3.29
i_c	30.70	2.45

5. Conclusion

This paper has presented a novel adaptive Neural Network control algorithm for controlling the renewable interfacing inverter. Such that it works satisfactorily under the dynamic operating conditions. It has also been shown that the inverter is able to perform all the duties of the shunt APF while maintaining the smooth bidirectional power flow simultaneously. The simulation results are provided to validate the fact that the renewable interfacing inverter can act as a multi operation device in order to utilize its maximum rating. The current unbalance, current harmonics, and load reactive power demand of an unbalanced nonlinear load at PCC are compensated effectively such that the grid side currents are always maintained as a balanced s of sinusoidal current at UPF. Moreover, the load neutral current is restricted to flow toward the grid side by supporting it locally from the fourth leg of the inverter. When the power generated from the renewable energy sources is more than the total load power demand, and then the grid-interfacing inverter with the proposed control approach successfully fulfils the total load demand (active, reactive, and harmonics) and delivers the remaining active power to the main grid at UPF operation.

References

- [1] Mukhtiar Singh, Ambrish Chandra, "Real-Time Implementation of NN Control for Renewable Interfacing Inverter in 3P4W Distribution Network", *IEEE Trans. Ind. Electron.*, vol. 60, no. 1, pp. 121–126, Jan. 2013.
- [2] M. Singh and A. Chandra, "Power maximization and voltage sag/swell ride-through capability of PMSG based variable speed wind energy conversion system", in *Proc. 34th Annual int. conf. of IEEE IECON*, vol. 10, pp.2206-2212, Nov. 2008.
- [3] F. Blaabjerg, R. Teodorescu, M. Liserre, and A. V. Timbus, "Overview of control and grid synchronization for distributed power generation systems", *IEEE Trans. Ind. Electron.*, vol. 53, no. 5, pp. 1398–1409, Oct. 2006.
- [4] P. Jintakosonwit, H. Akagi, H. Fujita, and S. Ogasawara, "Implementation and performance of automatic gain adjustment in a shunt-active filter for harmonic damping throughout a power distribution system", *IEEE Trans. Power Electron.*, vol. 17, no. 3, pp. 438–447, May 2002.
- [5] J. P. Pinto, R. Pregtzer, L. F. C. Monterio, and J. L. Afonso, "3-phase 4-wire shunt active power filter with renewable energy interface", presented at the 38th Annual conf. IEEE Renewable energy & power quality, vol. 10, pp. 405-408, May 2007.
- [6] J. H. R. Enslin and P. J. M. Heskes, "Harmonic interaction between a large number of distributed power

inverters and the distribution network", *IEEE Trans. Power Electron.*, vol. 19, no. 6, pp. 1586–1593, Nov. 2004.

- [7] B. K. Bose, *Modern Power Electronics and AC Drives*, Upper Saddle River, NJ: Prentice Hall, 2002.
- [8] M. Singh, V. Khadikar, "Grid interconnection of Renewable Energy Sources at the Distribution Level with Power-Quality Improvement Features", *IEEE Trans. on power delivery*, vol. 26, No. 1, Jan. 2011.
- [9] "Large scale integration of wind energy in the European power supply", European Wind Energy Association (EWEA), December 2005.
- [10] J. M. Espí, J. Castelló, R. García-Gil, G. Garcerá, and E. Figueres, "An adaptive robust predictive current control for three-phase grid connected inverters", *IEEE Trans. Ind. Electron.*, vol. 58, no. 8, pp.3537–3546, Aug. 2011.

Author Profile



Maddela Prasanth was born in Tirupathi, Chittoor dist, Andhra Pradesh, India in the year 1990. He was awarded B.Tech EEE degree in the year 2012 from SIETK, Puttur, Andhra Pradesh. Presently he is pursuing M.Tech degree in Power Electronics and Drives from CREC, Tirupati, Andhra Pradesh, India.



N. Vijay Simha was born in 1984. He received B.Tech degree from SVP CET in the year 2007 and M.Tech degree from S.V UNIVERSITY, Tirupati in the year 2010. He was working as assistant professor in CREC, Tirupati in Electrical & Electronics Department. His main research interests are Electrical Distribution System.