FFT analysis of source current after compensation is shown in Figure.13. It shows that THD is reduced to 1.44 % by using auto-tuned filters. Fifth order harmonics THD is reduced to 0.75% and seventh order harmonics THD is reduced to 0.96%. Comparison of THD for all the loads with and without filter is shown in table II.

TABLE II COMPARISON OF THD

LOAD	% THD OF SOURCE CURRENT					
	Without Filter			*With Auto-tuned filter*		
	%THD	*5th*	*7th*	*%THD*	*5th*	*7th*
Load 1	23.54	21.54	7.47	1.8	1.01	.92
Load 2	21.09	18.98	8.04	1.73	1.2	.87
Load 3	21.41	19.78	7.23	1.44	.75	.96

Reactive power requirement is compensated by auto-tuned passive filter so that only small amount of power is drawn from the source. Reactive power requirement of the load and reactive power needed to be supplied by the source is shown in table III.

TABLE III REACTIVE POWER REQUIREMENT

LOAD	Reactive power requirement of the load (VAR)	Reactive power supplied by the source (VAR)
Load 1	1620	161
Load 2	2200	220
Load 3	3000	324

IX. CONCLUSION

A three phase system with highly nonlinear and reactive load is chosen for the simulation. Auto-tuned passive filter is designed and simulated with ANN controller and Isinϕ controller and their performances are compared. The simulation result shows that the Isin ϕ controller is much faster compared to ANN based controller in generating switching pulses. Auto-tuned passive filter with both the controllers can achieve effective harmonic elimination and also performs reactive power compensation. Further modifications is possible in this system such as changing TSR branches by TCR, using double tuned filters or C type filters instead of single tuned filters etc.

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