Generation of Power Quality Events of Different Underlying Causes using Simulation

Aditya Mahore, Neha Dhande, Pooja Deshmukh, Pratik Unhale, Supriya Dambe, Yashashri Patil

Department of Electrical Engineering
Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra, India

Abstract: *The modern power system is plagued by many PQ disturbances that demand proper addressing. Many underlying causes lead to occurrence of PQ disturbances. Hence, it is necessary to analyze the root cause of the disturbance in Power Quality to facilitate corrective mitigation. This paper presents ways of generating power quality disturbances of different underlying causes using MATLAB simulation model. The voltage sag is the most commonly occurring PQ disturbance in power system. The various voltage sags are generated due different underlying cause like large transformer energization, Induction motor starting and line fault. The symmetrical and unsymmetrical voltage sags are generated using line fault Simulink model. The system is presented for the development of oscillatory voltage transients caused by capacitor bank energization. The first step for the aforementioned analysis is to generate required PQ disturbances. As a result, these models are applied to the development of power quality analysis algorithms to mimic various underlying reasons for power quality waveforms.*

Keywords: Voltage Sag, Oscillatory Transient, MATLAB Simulink

REFERENCES

[1]. Tan, R. H., & Ramachandaramurthy, V. K. (2013, June). Simulation of power quality events using Simulink model. In 2013 IEEE 7th International Power Engineering and Optimization Conference (PEOCO) (pp. 277-281). IEEE.

[2]. Granados-Lieberman, D., Romero-Troncoso, R. J., Osornio-Rios, R. A., Garcia-Perez, A., & Cabal-Yepez, E. (2011). Techniques and methodologies for power quality analysis and disturbances classification in power systems: a review. IET Generation, Transmission & Distribution, 5(4), 519-529.

[3]. Kumar, R., Singh, B., Kumar, R., & Marwaha, S. (2019). Recognition of underlying causes of power quality disturbances using Stockwell transform. IEEE Transactions on Instrumentation and Measurement, 69(6), 2798-2807.

[4]. Igual, R., Medrano, C., Arcega, F. J., & Mantescu, G. (2018, May). Integral mathematical model of power quality disturbances. In 2018 18th International Conference on Harmonics and Quality of Power (ICHQP) (pp. 1-6). IEEE.

[5]. O.P. Mahela, A.G. Shaik, N. Gupta, "A critical review of detection and classification of power quality events", Renewable and Sustainable Energy Review, vol. 41, pp. 495-505, 2015.

[6]. [7] M.K. Saini, R. Kapoor, "Classification of power quality events – A review", International Journal of Electrical Power & Energy Systems, vol. 43(1), pp. 11-19, 2012.

[7]. S.A. Deokar, L.M. Waghmare, "Integrated DWT–FFT approach for detection and classification of power quality disturbances", Electrical Power and Energy Systems, vol. 61, pp. 594–605, 2014

[8]. J.G.M.S. Decanini, M.S. Tonelli-Neto, F.C.V. Malange, C.R. Minussi, "Detection and classification of voltage disturbances using a fuzzyARTMAP-wavelet network", Electric Power Systems Research, vol. 81, pp. 2057–2065, Dec. 2011.

[9]. K. Manimala, K. Selvi, R. Ahila, "Optimization techniques for improving power quality data mining using wavelet packet based support vector machine", Neurocomputing, vol. 77, pp. 36–47, 2012.

[10]. S. Naderian, A. Salemnia, "An implementation of type-2 fuzzy kernel based support vector machine algorithm for power quality events classification", International Transactions on Electrical Energy Systems, vol. 27(5), 2016