

In general, it is shown that the greater the Fault Impedance, the smaller the number of voltage sags expected per year.

In general, the studies of voltage sags are more sensible of fault Impedance than Distributed Generation.

Acknowledgment

For the realization of this work the authors thank CELG Generation and Transmission SA – CELG GT by prospective vision that has allowed them to use the software ANAFAS in the simulations.

The author also thanks the of technology college Senai Italo Bologna.

References

- [1] M. H. J. Bollen, *Understanding Power Quality Problems: Voltage Sags and Interruptions*, McGraw-Hill, IEEE Press Series on Power Engineering, 2000.
- [2] J. A. M. Velasco, J. M. Arnedo, "Distributed Generation Impact on Voltage Sags in Distributions Networks," in *Proc. 9th International Conference on Electrical Power Quality and Utilization*, Barcelona, Spain, 2007, pp. 1-6.
- [3] H. S. Bronzeado et. al. "A Proposal for a National Nomenclature and Definitions of Terms Associated with Power Quality", in *Proc.II Brazilian Seminar on Quality of Electricity*, São Lourenço, Brazil, 1997, pp. 1-8. (In Portuguese)
- [4] M. N. Moschakis, N. D. Hatziaargyriou, "Analytical Calculation and Stochastic Assessment of Voltage Sags," *IEEE Transactions on Power Delivery*, vol. 21, no. 3, 2006, pp. 1727-1734.
- [5] J. A. M. Velasco, J. M. Arnedo. "Voltage Sag Stochastic Prediction Using an Eletromagnetic Transient Program," *IEEE Transactions on Power Delivery*, vol. 19, no.4, 2004, pp. 1975-1982.
- [6] J. V. Milanovic, M. T. Aung, C. P. Gupta. "The Influency Of Fault Distribution on Stochastic Prediction of Voltage Sags," *IEEE Transactions on Power Delivery*, vol. 20, no. 1, 2005.
- [7] J. V. Milanovic, R. Gnativ, K. W. M. Chow, "The Influency Of Loading Conditions And Networks Topology On Voltage Sags," *Harmonics and Quality of Power*, IEEE, Orlando, vol. 2, 2000, pp. 757-762.
- [8] Y. S. Lim, G. Strbac, "Analytical Approach to Probabilistic Prediction of Voltage Sags on Transmission Networks," *IEE Proc. Gener. Transm. Distrib.*, vol. 149, no. 1, 2002, pp. 7-14.
- [9] J. A. M. Velasco, J. M. Arnedo, "Voltage Sag Studies in Distribution Networks – Part II: Voltage Sag Assessment," *IEEE Transactions on Power Delivery*, vol. 21, no. 3, 2006, pp. 1679-1688.
- [10] T. Ackermann, G. Andersson, L. Soder, "Distributed Generation: a definition", *Electrical Power Systems Research*, vol. 57, no.3, 2001, pp. 195-204.
- [11] C. T. Hsu, C. J. Fu, "Dispersed Generation Systems Impact on the Voltage Sags in Distribution Systems," in *Proc. International Conference on Power System Technology*, Chongqing, China, 2006, pp. 1-7.
- [12] T. N. Boutsika, S. A. Papathanassiou, "Short-circuit calculations in networks with distributed generation," *Electrical Power Systems Research*, vol. 78, no. 7, 2008, pp.1181-1191.
- [13] Research Center Electricity - CEPEL, user manual analysis program simultaneous faults - ANAFAS, v. 4.4, Rio de Janeiro, Brazil, 2007. (In Portuguese)
- [14] G. Olguin, D. Karlsson, R. C. Leborgne, "Stochastic Assessment of Voltage Sags (Dips): The Method of Fault Positions versus a Monte Carlo Simulation Approach," *In Power Tech*, IEEE, Rússia, 2005, pp. 1-7.
- [15] J. M. C. Filho et. al, "Validation of voltage sag simulation tools: ATP and short-circuit calculation versus field measurements," *IEEE Transactions on Power Delivery*, vol. 23, no. 3, 2008, pp. 1472-1480.
- [16] W. Freitas et. al, "Comparative Analysis Between Synchronous and Induction Machines for Distributed Generation Applications," *IEEE Transactions on Power System*, vol. 21, no. 1, 2006, pp. 301-311.
- [17] ATP – Alternative Transients Program. User's Manual, 1996.
- [18] P. M. Anderson, A. A. Fouad. *Power System Control and Stability*, IEEE Press Power Systems Engineering Series, 1st ed., Iowa State University Press, 1977.
- [19] Procedures for distribution of electricity in the national grid system (PRODIST) - Module 8: power quality, ANEEL, 2008. (In Portuguese)
- [20] Electromagnetic Compatibility (EMC) – Part 2: Environment - Section 6: Voltage Dips and short interruptions on public electric power supply systems with statistical measurements results, *IEC 61000-2-8*, 2002.
- [21] J. C. Cebrian, N. Kagan, "Hybrid Method to Assess Sensitive Process Interruption Costs Due to Faults in Electric Power Distribution Networks", *IEEE Transactions on Power Delivery*, vol. 25, pp. 1686 – 1696, 2010.
- [22] Ramos, A. C. L.; Batista, A. J.; Domingues, E. G.; Calixto, W. P. A First Approach on the Fault Impedance Impact on Voltage Sags Studies, 2015. La Coruña, Spain, International Conference on Renewable Energies and Power Quality (ICREPQ'15).
- [23] Ramos, A. C. L.; Batista, A. J.; Domingues, E. G.; Leborgne, R. C.; Calixto, W. P. A First Approach on the Impact of Distributed Generation on Voltage Sags Studies, 2014. Cordoba, Spain, International Conference on Renewable Energies and Power Quality (ICREPQ'14).
- [24] Ramos, A. C. L.; Batista, A. J.; Domingues, E. G.; Leborgne, R. C.; Calixto, W. P. A First Approach on the Impact of Distributed Generation na network topology on Studies of Voltage Sags, 2017. Salamanca, Spain, International Conference on Renewable Energies and Power Quality (ICREPQ'18).