

{tag} International Journal of Computer Applications
Foundation of Computer Science (FCS), NY, USA

[Volume 137](#)

-
[Number 9](#)

Year of Publication: 2016

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10.5120/ijca2016908919

{bibtex}2016908919.bib{/bibtex}

Abstract

The voltage instability phenomena occur in both transmission systems and distribution systems. The weakening of voltage stability level will limit the growth of load served by distribution companies. Voltage instability in power distribution systems could lead to voltage collapse and thus power blackouts. The integration of distributed generation (DG) in the distribution system has increased to high penetration levels. The ultimate goal of this paper is studying the impact of DG units under varied penetration level on some issues, such as voltage stability, voltage profile, power flow and PV curves for each bus. This paper analyzes and discusses the performance of static voltage stability of 15 buses a practical distribution system in the Kumamoto area in Japan by using Fast Voltage Stability Index FVSI and varying the load ability with varied DG penetrations. In this paper, two types of DG sources are used in distribution systems wind turbine and photovoltaic.

References

1. R.M. Dell and D.A.J. Rand, "Energy storage—A key technology for global energy sustainability," *J. Power Sources*, vol. 100, issues 1-2, pp. 2-17, Nov. 2001.
2. Y. M. Atwa and E. F. El-Saadany, "Optimal Allocation of ESS in Distribution Systems with a High Penetration of Wind Energy," *IEEE Trans. Power Syst.*, vol.25, no.4, pp.1815-1822, Nov. 2010 .
3. R. S. Al Abri , E. F. El-Saadany and Y. M. Atwa, "Distributed Generation Placement and Sizing Method to Improve the Voltage Stability Margin in a Distribution System" *IEEE Electric Power and Energy Conversion Systems (EPECS)*, Sharjah, 2011.
4. Pathomthat Chiradeja, R.Ramakumar, "An Approach to Quantify the Technical Benefits of Distributed Generation", *IEEE Transactions on Energy Conversion*, Vol.19, No.4, December 2004.
5. Pathomthat Chiradeja, R.Ramakumar, "An Approach to Quantify the Technical Benefits of Distributed Generation", *IEEE Transactions on Energy Conversion*, Vol.19, No.4, December 2004.
6. J. M. Sexauer, and S. Mohagheghi, "Voltage quality assessment in a distribution system with distributed generation—a probabilistic load flow approach," *IEEE Trans. Power Del.*, vol. 28, no. 3, pp. 1653- 1662, Jul. 2013.
7. S. Eftekharnjad, V. Vittal, G. T. Heydt, B. Keel, and J. Loehr, "Impact of increased penetration of photovoltaic generation on power systems," *IEEE Trans. Power Syst.*, vol. 28, no. 2, pp. 893-901, May 2013.
8. E. Naderi, H. Seifi, and M. S. Sepasian, "A dynamic approach for distribution system planning considering distributed generation," *IEEE Trans. Power Del.*, vol. 27, no. 3, pp. 1313-1322, Jul. 2012.
9. Haiyan Chen, Jinfu Chen, Dongyuan Shi, Xianzhong Duan, Member, IEEE, "Power Flow Study and Voltage Stability Analysis for Distribution Systems with Distributed Generation", *IEEE*, 2006, 1-4244-0493.
10. "Voltage Stability of Power Systems: Concepts, Analytical Tools and Industry Experience", *IEEE Committee Vol.IEEE/PES 93TH0358-2- PWR* 1990.
11. K. Takahashi and Y. Nomura "The Power System Failure on July 23rd 1987 in Tokyo" *CIGRE SC-37 Meeting 37.87(JP)07(E)* 1987.
12. Prada, R.B.; Souza, L.J.; "Voltage stability and thermal limit: constraints on the maximum loading of electrical energy distribution feeders", *IEE Proceedings-Generation, Transmission and Distribution*, Volume 145, Issue 5, Sept. 1998 Page(s): 573 – 577.
13. Liu Daowei, Xie Xiaorong, Mu Gang, "An on-line voltage stability index of power system based on synchronized phasor measurement", *Proceedings of the CSEE*, 2005, 25(1): 13-17.
14. Haiyan Chen, Jinfu Chen, Dongyuan Shi, Xianzhong Duan, Member, IEEE, "Power Flow Study and Voltage Stability Analysis for Distribution Systems with Distributed Generation", *IEEE*, 2006, 1-4244-0493.
15. P.Kundur "Power System Stability and Control" McGraw-Hill, New York, 1994.
16. G.K.Morison, B.Gao and P.Kundur, "Voltage Stability Analysis Using Static and Dynamic Approaches", *IEEE Trans. Vol.PS-8, No.2*, August 1993.
17. R. S. Al Abri, E. F. El-Saadany, and Y. M. Atwa, "Optimal placement and sizing method to improve the voltage stability margin in a distribution system using distributed generation," *IEEE Trans. Power Syst.*, vol. 28, no. 1, pp. 326-334, Feb. 2013.
18. M. D. McDonald, R. A. Walling, R. D'Aquila, and J.G. Cleary, "Effect of distributed

generation on regional voltage stability,” in Proc. IEEE Power Eng. Soc. Trans. Distrib. Conf., Orlando, United States, May 2012, pp. 1–6.

19. A. B. Rodrigues, R. B. Prada, and M. D. G. Da Silva, “Voltage stability probabilistic assessment in composite systems: modeling unsolvability and controllability loss,” IEEE Trans. Power Syst., vol. 25, no. 3, pp. 1575–1588, Aug. 2010.

20. P. C. Loh, D. Li, Y. K. Chai, and F. Blaabjerg, “Hybrid AC–DC microgrids with energy storages and progressive energy flow tuning,” IEEE Trans. Power Electron., vol. 28, no. 4, pp. 1533–1543, Apr. 2013.

21. Claudia Reis, F.P. Maciel Barbosa ,” A Comparison of Voltage Stability Indices” IEEE MELECON 2006, May 16-19, Benalmádena (Málaga), Spain.

22. I.Musirin, T.K.A.Rahman “Novel Fast Voltage Stability Index (FVSI) for Voltage Stability Analysis in Power Transmission System” 2002 Student Conference on Research and Development Proceedings, Shah Alam, Malasia, July 2002.

23. Claudio Canizares “Voltage Stability Assessment: Concepts, Practices and Tools” IEEE/PES Power System Stability Subcommittee Special Publication, August 2002.

24. C. A. Canizares and F. L. Alvarado, “Point of collapse and continuation methods for large AC/DC systems,” IEEE Trans. Power Syst., vol. 8, pp. 1-8, 1993.

25. S. Li K. Tomsovic ,T. Hiyama”Load Following Functions Using Distributed Energy Rtsources”0-7803-6420-2000 IEEE.

Index Terms

Computer Science

Power Systems

Keywords

Voltage Stability, Distributed Generation, Loadability, Static Voltage Stability, Power Flow, Wind Turbine and Photovoltaic.