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Abstract

Fault Protection and Dynamic Control Strategy for Microgrids with High Renewable Energy

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Abstract:

Microgrid is a group of interconnected loads and distributed energy resources (including microturbines, diesel generators, energy storage, renewable resources, and all other kinds of distributed energy resources) at distribution level with defined electrical boundaries that has black start capacity and can operate in island mode and/or grid-connected mode. Because of the uncertainty, intermittent, and discontinuity of the renewable resources, transient disturbance and dynamic disturbance exist in the microgrid. For the fault current is small in the system and the microgrid has very little inertia, the disturbance control and fault protection of microgrids are more difficult than the ones of traditional grids.The most challenging part of protection and dynamic control of microgrids is how to distinguish whether a fault or disturbance is occurring in the system. In the microgrid, there may appear transient characteristics similar to the transient and dynamic disturbance at the initial faults. If there is a fault, the transient disturbance control should be used to prevent the system from collapsing and make sure the right breakers should be tripped. But if there are transient and dynamic disturbances, even the initial characteristics of the transient and dynamic are very similar to the fault ones, the breakers should not be tripped. So that Mr. Zheng has been leading his team to propose and develop the dynamic disturbance control, transient disturbance control and fault protection technologies, and they all have been well applied in practical projects.The microgrid dynamic disturbance control technology, transient disturbance control technology and fault protection technology have been evaluated by domestic and foreign experts as reaching the international leading level.

Biography:

Dehua Zheng has completed his B.Sc. and M.Sc. degrees in Electrical Engineering from North China Electric Power University, Beijing, China in 1982 and 1987, respectively. He has also graduated another M.Sc. degree in Computer Engineering from the University of Manitoba, Canada in 1995. He has published more than 20 invention patents related to microgrid, renewable reseach energy areas. He has published more than 30 papers among which 6 SCI and EI journals. Dehua Zheng is currently a IEEE Senior Member, Deputy Director of China Smart Distribution System & Decentralized Generation Committee, Chief Scientist&General Manager of Goldwind

Science and Technology Co., Ltd., IEC project leader for IEC/TS 62898-3-1 standard: "Microgrids – Technical Requirements – Protection and Dynamic Control"(currently the standard has reached the state of DTS), and he is registered senior electrical engineer in North America and PhD. professor in many universities. He has been entitled as many international renewable conference organizing members or chairs and keynote speakers.

Recent Publications:

1. Velik, R., & Nicolay, P. (2014). Grid-price-dependent energy management in microgrids using a modified simulated annealing triple-optimizer. Appl Energy, 130, 384–395.
2. Velik, R. (2013). "The influence of battery storage size on photovoltaics energy self-consumption for grid-connected residential buildings." IJARER International Journal of Advanced Renewable Energy Research, 2(6).
3. Velik, R. (2013). "Battery storage versus neighbourhood energy exchange to maximize local photovoltaics energy consumption in gridconnected residential neighbourhoods." IJARER International Journal of Advanced Renewable Energy Research, 2(6).
4. Velik, R (2013). "Renewable energy self-consumption versus financial gain maximization strategies in grid-connected residential buildings in a variable grid price scenario." IJARER International Journal of Advanced Renewable Energy Research, 2(6).
5. Chen, Y., Lu, S., Chang, Y., Lee, T., & Hu, M. (2013). Economic analysis and optimal energy management models for microgrid systems: a case study in Taiwan. Appl Energy, 103, 145–154.

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