



Survey on Voltage Stability

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Abstract –There is lots of problem of continuity in our day-to-day life. To resolve that problem, we go for the survey of voltage stability options. Author found number of options for stability purpose but there are some drawbacks in that systems. So, we try to overcome those drawbacks in our next work.

Literature Survey

Zhenlong Wua, Yanhong Liua, YangQuan Chenb, Donghai Lic, Bingnan Lid, Feng Zhud in December 11, 2021 has proposed a theory in front of us that, the reliability and stability of the power grid are facing lots of problems. The frequency is varied by the load variation. To handle these, the load frequency regulation is becoming a powerful alternative. This paper focuses on the load frequency regulation for multi-area power systems with renewable sources through

active disturbance rejection control (ADRC). By introducing a multi-area power system with renewable sources, a cascaded ADRC structure is structured for a multi-area power system, which contains a photovoltaic system, a thermal system and a wind system. Based on the ADRC principle and the parameter stability region, a practical and effective design procedure for the proposed cascaded ADRC is provided. Simulations illustrate that the proposed cascaded ADRC can ensure the stronger ability to reject the consumed power compared with other comparative control strategies under different scenarios. Besides, it needs the shortest time to return to the stable state with the smallest overshoot under all operating



conditions when the load variance occurs. The successful application of the multi-area power system indicates a promising potential of the proposed cascaded ADRC in the power industry.[1]

Guolian Hou, Yin Ke, Congzhi Huang in 15 April 2021 has proposed a theory in front of us that, to improve the power conversion effectively, it is necessary to adopt photovoltaic. Maximum power point tracking technique is adopted in most photovoltaic (PV) power plants. if one should go for expansion of PV installed capacity it has to face lots of problem.so that it is necessary to realize PV constant power generation (CPG) in the presence of grid side and plant side. a CPG scheme based on the error-based active disturbance rejection control (EADRC) approach and the perturb & observe method is for faster dynamic performance. For this method it is necessary to switched operation mode adaptively and move operational point flexibly. At the end, effective and feasibility of EADRC based CPG scheme have been validated experimentally.[2]

Jia Ren, Zengqiang Chen ,Mingwei Sun ,Qinglin Sun, Zenghui Wang in 4 January 2022 has proposed a theory in front of us that, Active Disturbance Rejection Control (ADRC) is used in various controlling system, but it has some limitations in controlling. In this work we combine the ADRC and PI-GPC technique designs a PI-ADRGPC method. It replaces the PD controller with Proportion Integral-type Generalized Predictive Control (PI-GPC), it improves the performance of systems. This paper proposes to use the Grey Wolf Optimization (GWO) for tuning, whose structure can also be used by other intelligent optimization algorithms. The performance of GWO tuned PI-ADRGPC is compared with the control performance of GWO tuned ADRC method, Multi-Verse Optimizer (MVO) tuned PI-ADRGPC and MVO tuned ADRC. The simulation results show that the proposed strategy can track reference well and has a good disturbance rejection performance.[3]

Piotr Skupin, Paweł Nowak, Jacek Cieczot in 21 June 2021 has proposed a theory in front of us that, Time delay systems are frequently



encountered in industrial applications. a stability analysis of a closed-loop system with an active disturbance rejection control (ADRC) and a reduced-order extended state observer (RESO). The controller is designed for first-order plus delay time processes, and one of the input signals to the RESO is delayed to compensate for the effect of the system delay. If the process delay is known, perfect synchronization between the observer input signals can be achieved. In a more realistic case, the process delay is not precisely known, and the resulting imperfect synchronization may lead to instability of the closed-loop system.[4]

M.H. Suid, M.A.Ahmad in 16 December 2021 has proposed a theory in front of us that, Automatic Voltage Regulator (AVR) is fabricated to sustain the voltage level of a synchronous generator spontaneously. Several control strategies have been introduced into the AVR system with the aim of gaining a better dynamic response. One of the most universally utilized controllers is the Proportional–Integral–Derivative (PID) controller. Despite the PID controller having a relatively high dynamic response, there are

still further possibilities to improve in order to obtain more appropriate responses. This paper designed a sigmoid-based PID (SPID) controller for the AVR system in order to allow for an accelerated settling to rated voltage, as well as increasing the control accuracy. In addition, the parameters of the proposed SPID controller are obtained using an enhanced self-tuning heuristic optimization method called Nonlinear Sine Cosine Algorithm (NSCA), for achieving a better dynamic response, particularly with regards to the steady-state errors and overshoot of the system. A time-response specifications index is used to validate the proposed SPID controller. The obtained simulation results revealed that the proposed method was not only highly effective but also greatly improved the AVR system transient response in comparison to those with the modern heuristic optimization based PID controllers.[5]

Afzal Sikander, Padmanabh Thakur in 23 November 2019 has proposed A new control design strategy for automatic voltage regulator in power system, this technique used to determine the optimal values of



PID controller gains of an automatic voltage regulator, using the evolutionary algorithm namely 'Cuckoo Search'. By estimating its transient response, the dynamic performance of the controller is evaluated. After completion the comparison between the proposed system and the existing model is made for better analysis. From that analysis it can be conclude that the proposed system is more suitable and has more significant than existing one. In addition, stability analysis between proposed system and existing system is investigated through root locus and bode plot. It can be concluded that, the proposed controller not only capable to provide good dynamic response, but also exhibits stable performance for wide range of open loop gains.[6]

Review

This survey is completely based on voltage stability. All should know that voltage stability is major concern in our power industry. For powerful supply chain voltage stability is important aspect. In this paper authors did the survey of lots of techniques related to voltage stability. But there is some

gap found in this survey. In this survey, we found that some authors used cascaded system which is very bulky to construct and difficult to handle. Some authors recommend to use PID controller , but PID controller can't cope up with some properties of ADRC. Some author uses only automatic voltage regulator, but it only not sufficient to provide stable voltage to the power system. AVR with PID system also can't give proper result. So, to overcome such kind of drawback we can proposed a system in which automatic voltage regulator is merged with active disturbance rejection control which can give stable voltage to the distribution system. This system will be employed in our next work.