Application of Different Optimization Techniques to Load Frequency Control with WECS in A Multi-Area System

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Abstract

This article presents a load frequency control in a two-area interconnected system under wave energy disturbance. At steady state, the system frequency is maintained at the nominal value so there is no frequency deviation. Also, there is no deviation in the tie line power from the value at steady state. But increasing and decreasing of load in any of the two areas may affect the system frequency. Renewable energy variation also can affect the frequency deviation. In this article, first two controllers are used to enhance the system stability during the load change. These controllers are proportional-integral-derivative (PID) and proportional-integral-derivative and acceleration (PIDA). Three optimization techniques are presented in this article to tune the controllersû parameters. The optimization techniques are teaching-learning-based-optimization (TLBO), harmony search algorithm (HS) and sine-cosine algorithm (SCA). PIDA and TLBO have been proved the best performance during the transient period. The system is then subjected to a disturbance in the form of wave energy conversion system (WECS) when it is equipped with PIDA and using TLBO technique.

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