

Start-up decision of a rapid-start unit for AGC based on machine learning

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Abstract-

Units within a control area, participating in the secondary frequency control, are usually spinning generating units already connected to the network and operating outside their range of optimal performance. This paper deals with an alternative method of providing secondary frequency control called rapid-start (RS). It consists in assigning a regulation band to several offline units (RS units) which are capable of being started and connected rapidly, therefore allowing the online units to function more closely to their nominal power. RS units have commonly been used for peaking generation and for tertiary control reserve, and have been rarely used for secondary control reserve. As RS operation may have economic benefits, since it allows for better dispatch of the other units in the control area, an appropriate algorithm to start up an RS unit needs to be developed. This paper proposes a machine learning based system (MLBS) to be employed in the decision to start up an RS unit while being used to provide secondary frequency control. The decision-making procedure is carried out by a decision tree. The building and implementation of the RS machine learning based system is illustrated for a secondary frequency control zone within the Spanish power system.

Index Terms- Clustering, decision tree, machine learning, rapid-start, secondary regulation.

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