

Performance evaluation of start-up decisions of rapid-start units for AGC

I. Saboya, I. Egidio, E. Lobato

Abstract— Generating units, participating in the secondary frequency control of a control area, are usually spinning 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 off-line units (RS units) which are capable of being started and connected rapidly, therefore allowing the online units to operate closer to their nominal power. As RS operation may have economic benefits, an appropriate algorithm to start up an RS unit needs to be developed. This paper proposes a methodology to evaluate, compare, and choose the most appropriate RS algorithm among the ones developed for a certain AGC control area. An optimization model provides a reference by determining the hypothetically ideal start-ups and shut-downs of RS units. In addition, the definition of performance indexes to evaluate, compare, and choose the different RS algorithms is proposed. The proposed methodology is illustrated for a secondary frequency control zone within the Spanish power system by using real data signals.

Index Terms— Mixed-integer linear programming, Rapid-Start, secondary regulation.

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