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Wind farms in AGC: modelling, simulation and validation

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Abstract-

Wind farms are increasingly interested in participating in the secondary frequency control, especially in power systems where AGC is organized by regulation zones comprising generation units of different technologies. In order to estimate the wind farms behaviour and overall impact on automatic generation control (AGC), a reasonably simple wind farm model is needed. First-order and second-order linear models of wind farms are proposed in the literature in AGC-related studies. However, these simple models neglect key dynamic features for AGC integration of wind farms, such as artificial ramp limitations, dead bands, communication delays and start-up delays caused by turbine orientation. This paper presents a still simple wind farm model, however representing all relevant dynamics and availability constraints at power system control level. Applying an illustrative case study, model parameters are tuned and validated by means of field measurements, recorded during a response trail run of a real wind farm of 30 MW installed power operating within the Spanish power system.

Index Terms-

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