

ABSTRACT

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Graduate Student: Nguyen Ha Thanh

Supervisor: PhD Pham Ngoc Thanh

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Due to the intermittent power generation, wind farms integrated into the grid may cause a problem of large frequency fluctuation, when the capacity of load frequency control (LFC) is not enough to compensate the unbalance between the generation and the load demand. In this study, a new robust LFC strategy against load disturbance and wind power fluctuation is proposed to improve the disturbance-resistant performance of the power system with wind farms. This paper addresses this need by developing a comprehensive frequency response model for an islanded power grid incorporating both a conventional non-reheat thermal power plant and a wind power plant. The objective is to construct a detailed mathematical framework, presented through transfer function block diagrams and a consolidated state-space representation, that effectively models the dynamic interactions between conventional and wind generation sources. This model will serve as a foundational tool for subsequent analysis and the design of effective LFC strategies in modern, renewable-integrated power systems.