Deping Ke , Feifan Shen, C. Y. Chung , Chen Zhang , Jian Xu , and Yuanzhang Sun, 2018, Application of information gap decision theory to the design of robust wide-area power system stabilizers considering uncertainties of wind power, *IEEE Transactions on Sustainable Energy,* vol. 9, no. 2, April 2018, pp.805–817.

Abstract This paper proposes the application of information gap decision theory (IGDT) to the design of robust wide-area power system stabilizers (WPSSs) with consideration of wind farm (WF) power outputs variations and transmission line outages. According to IGDT, an optimization problem is constructed to tune WPSS parameters. Then, the derived optimal WPSSs can achieve explicit and favorable robustness to ensure the required damping control effects on the inter-area oscillations over a maximum variation range of WF steady-state power outputs in normal and emergent operating conditions. Moreover, with the intent of using the excellent global searching capability of particle swarm optimization (PSO), a customized PSO algorithm is proposed to efficiently solve the resulting highly nonlinear programming problem. Finally, simulations are carried out on a modified New England (10-machine 39-bus) system to validate the efficiency of the IGDT-based design method. The derived WPSSs exhibit expected robustness with respect to the wind power variations and transmission line outages.

Keywords Information gap decision theory, wide-area power system stabilizers, wind power, particle swarm algorithm.

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