Robust PID tuning of AVR system based on indirect design approach-2

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ABSTRACT

The Automatic Voltage Regulator (AVR) has been developed with the automated purpose of maintaining voltage stability for synchronous generators. This structure is often controlled by installation of the Proportional-Integral-Derivative (PID) controller. Contemporary heuristic approaches further inspired scholastic pursuits which advocate numerous innovative PID-based optimization techniques. Nevertheless, offsetting of such benefits and precision on disproportionate theoretical outcome by existence of modelling errors and uncertainties has necessitated continuous effort in tuning the PID controller. Considering possible jeopardizing of operational effectiveness and consistency through manualized optimization of controller's parameters, the current study essentially secured the effectiveness of a PID-controlled AVR system through online tuning. The adopted indirect design technique emphasized exclusive optimization of frequency shift constant of a formerly optimized PID controller as employed within an AVR structure. Enhancement of control efficacy and operation is achievable through revised parameters in the earlier PID controller from an updated frequency shifted constant. Compatibility of the introduced optimization mechanism was contrasted against parameters of the formerly optimized PID controller on the account of maximum sensitivity, gain and phase margins. Conducted simulations demonstrate substantial enhancement in performance of AVR structure with PID con-troller through parametric refining of the introduced mechanism.

KEYWORDS

Frequency shifting; Indirect design approach; PID tuning; Robustness

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