

## Power System Stability Enhancement Using Self Tuning Fuzzy PI Controller for TCSC

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**Abstract :** In this paper, a self-tuning fuzzy PI controller (STFPIC) is proposed for thyristor controlled series capacitor (TCSC) to improve power system dynamic performance. In a STFPIC controller, the output scaling factor is adjusted on-line by an updating factor ( $\alpha$ ). The value of  $\alpha$  is determined from a fuzzy rule-base defined on error (e) and change of error ( $\Delta e$ ) of the controlled variable. The proposed self-tuning controller is designed using a very simple control rule-base and the most natural and unbiased membership functions (MFs) (symmetric triangles with equal base and 50% overlap with neighboring MFs). The comparative performances of the proposed STFPIC and the standard fuzzy PI controller (FPIC) have been investigated on a multi-machine power system (namely, 4 machine two area system) through detailed non-linear simulation studies using MATLAB/SIMULINK. From the simulation studies it has been found out that for damping oscillations, the performance of the proposed STFPIC is better than that obtained by the standard FPIC. Moreover, the proposed STFPIC as well as the FPIC have been found to be quite effective in damping oscillations over a wide range of operating conditions and are quite effective in enhancing the power carrying capability of the power system significantly.

**Keywords :** genetic algorithm, power system stability, self-tuning fuzzy controller, thyristor controlled series capacitor

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