

## Realization of the Relay Feedback Method Using Integrals

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In industry, the relay feedback method has been used to excite the process to tune Proportional-Integral-Derivative (PID) controllers automatically.

But, it has an approximation error which occurs from neglecting high harmonic terms. To overcome the problem of the conventional relay feedback method, the relay feedback method using the integrals of the process input and output was proposed. However, these methods cannot be applied to the process under noisy and disturbance environment in a direct way.

A new relay feedback method combining a new disturbance estimator and noise magnitude estimator is proposed to provide fairly accurate frequency response model by removing the effect of disturbances and noises in estimating frequency data.

To confirm the performance of the proposed method and compare it with the previous approaches, we apply the proposed method to a real liquid level control system. The proposed method shows good disturbance rejection and noise suppressing performance, resulting in much better frequency response estimation.