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## Adaptive GSA-Based Optimal Tuning of PI Controlled Servo Systems With Reduced Process Parametric Sensitivity, Robust Stability and Controller Robustness

By: [Precup, RE](#) (Precup, Radu-Emil)<sup>[1]</sup>; [David, RC](#) (David, Radu-Codrut)<sup>[1]</sup>; [Petriu, EM](#) (Petriu, Emil M.)<sup>[2]</sup>; [Radac, MB](#) (Radac, Mircea-Bogdan)<sup>[1]</sup>; [Preitl, S](#) (Preitl, Stefan)<sup>[1]</sup>

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### Abstract

This paper suggests a new generation of optimal PI characterized by saturation and dead zone static nonlinearity and an integral component. The objective functions are expressed as the sum of the squared error plus the weighted sum of the integrals of output with respect to two process parametric variations. The simplified linear process model involve a single design optimum (ESO) method which offers the desired tracking performance. An original back-calculation and tracking anti-windup integrator wind-up and to compensate for the dead z

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the objective functions is carried out in the framework of constraints which guarantee the robust stability with controller robustness. An adaptive gravitational search problems focused on the optimal tuning of the design anti-windup tracking gain. A tuning method for PI controller design of resilient control systems. The tuning method validated by the adaptive GSA-based tuning of PI controller laboratory servo system.

## Keywords

**Author Keywords:** [Anti-windup tracking gain](#); [controller robustness](#); [objective functions](#); [PI controllers](#); [process parametric sensitivity](#); [servo systems](#)

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