

Cross-Species Bio-Inspired Adaptive Control: A Novel Extension of Chameleon PID

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Abstract: *The modern control systems operate in a very dynamic and uncertain environment in which the classical PID controllers face performance degradation due to the fixed values of the controller gains. The proposed Chameleon-PID algorithm is based on environment-friendly adaptive tuning inspired by the bio-colour adaptation of chameleons. However, the proposed bio-inspired chameleon model has more structural limitations due to the absence of co-operative optimization, reactive nature, and the ability of rejecting a disturbance. Furthermore, the proposed research aims to solve the abovementioned limitations of the chameleon-inspired model based on the proposed Multi-Species Bio-Inspired Hybrid Adaptive PID model that combines the environment-friendly approach of the chameleon-inspired model with the co-operative optimization of the ant colony-inspired model, as well as the suppression of the disturbed response of the proposed artificial immunology-inspired model. The proposed bio-inspired model of the control system will be extensively analysed with the help of a conceptual analysis that proves the proposed model can achieve better results than other single-species adaptive models in terms of the suppression of the overshoot value of the proposed control model.*

Keywords: Adaptive PID, Bio-Inspired Computing, Hybrid Control, Swarm Intelligence, Artificial Immune System, Real Time Systems, Intelligent Control

