

# Conception of fractional $PI^\lambda$ controller through classical PI controller

**K. Gherfi, A. Charef, H.A. Abbassi, D.Idiou**

**Abstract :** Fractional order  $PI^\lambda D^\mu$  controllers are gaining more interests from the control community. They have been introduced in the control loops in a continuous effort to ameliorate the system control performances. In this work, the design of the fractional order  $PI^\lambda$  controller derived through the regular PI controller used for the first order lag plus time delay control system is proposed. The main idea of this article is the tuning of the parameter  $\lambda$  of the fractional order  $PI^\lambda$  controller to ameliorate the overshoot, the integral squared error and the settling time performances of the step response of the feedback control system compared to the ones of the feedback control system with the corresponding classical PI controller. The control quality enhancement of the proposed  $PI^\lambda$  controller scheme compared to the corresponding classical PI controller has been presented through the simulation results of illustrative examples.

**Keywords :** component; fractional order controllers; fractional order PI controllers; PI tuning, time delay.