

1165-34-316

**Blas M Vinagre\***, bvinagre@unex.es, 06006. *Back to Basics: Control Actions and State Space with Fractional Integro-Differential Operators*

The beauty of the proportional-integral-derivative (PID) algorithm for feedback control derives from its simplicity and efficiency. It combines the three natural ways of taking into account the error: the actual value (proportional), the accumulated error (integral), and the prediction of the error (derivative); the three gains depend on the magnitude of the error, the time required to eliminate the accumulated error, and the prediction horizon of the error. On the other hand, control techniques in state space require the description of the system in this same domain, that is, a model of states of the system to be controlled, but control strategies does not require that all state variables have a physical meaning. They only require something like this to those that we measure and that, habitually, we take as outputs. The use of observers releases us from this requirement. Furthermore, the observers allow to look inside the system and obtain as much dynamic information as convenient for control purposes. When modeling, we always made a selective destruction of information. This work explores the meaning of integral and derivative actions and gains provided by the consideration of non integer integration and differentiation orders, as well as the significanc of the information granted by taking into account a richest concept of state. This is joint work with Inés Tejado and Carlos M. Vinagre. (Received January 20, 2021)