Iterative Learning Control - The Repetitive Process Approach

Iterative learning control (ILC) is a technique for controlling systems operating in a repetitive (or pass-to-pass) mode with the requirement that a reference trajectory $r(t)$ defined over a finite interval $0 < t < T$ is followed to a high precision. Examples of such systems include robotic manipulators that are required to repeat a given task to high precision, chemical batch processes or, more generally, the class of tracking systems. Motivated by human learning, the basic idea of ILC is to use information from previous executions of the task in order to improve performance from trial-to-trial in the sense that the tracking error is sequentially reduced.

The overall process can be characterised in a two (multi) dimensional way, where some variables represent internal dynamics of the object/process and the additional represents trials, iterations, passes. Hence, a possibility to employ the repetitive processes approach.