Learning control systems for high performance printing

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Description of Poster

Many systems are required to perform repeating tasks and are thus subject to repetitive disturbances. Control systems that exploit this repeating nature of tasks can lead to superior performance when compared to classical linear controllers. These control strategies are mostly known in literature as Iterative Learning Control (ILC) or Repetitive Controllers (RC).

This research (2011-2015) is in collaboration with Océ Technologies (Venlo, The Netherlands), a printer manufacturer for the professional market. Printing systems are a prime example of systems in which disturbances and tasks are repetitive. The objective of this research is to develop learning control strategies which are particularly suited for the control problems encountered in printing systems such that performance can be increased or costs can be reduced.

In iterative learning control, every repetition of a task is referred to as a trial. The ILC calculates a feed-forward signal based on measurements of the tracking error at the end of each trial. As a first result, consider a type of ILC in figure 1. The control loop consists of a standard linear feedback, and a learning controller which uses basis functions to construct the feed forward signal from a set of parameters. This variant is known as ILC with basis functions.

This controller is applied experimentally to a mechanical system which performs a positioning task. Figure 2 shows the measured tracking error *e* for three trails. Trial 0 is shown in (a), (b) shows trial 1, and. The error after two trials is reduced a factor 20.

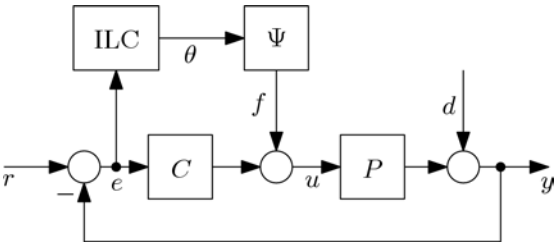

Figure 1: Control system setup

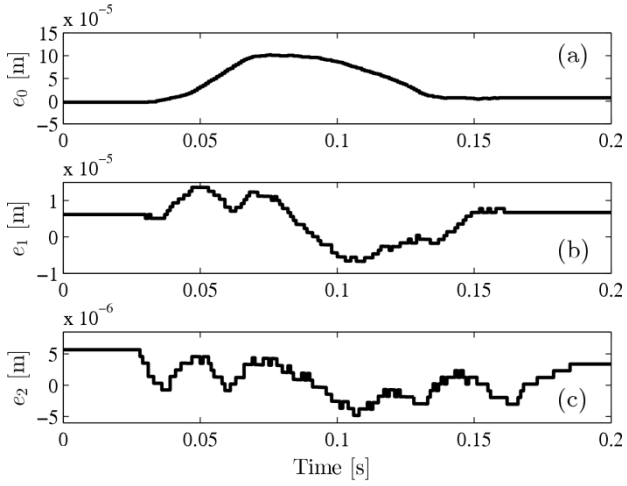

Figure 2: Tracking errors for different trials