# The Iterative Learning Control of a Stewart Platform System


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**ABSTRACT**

An iterative learning controller (ILC) adjusts the learning parameters by repeating control operations. Tracking error from a previous stage is used as the correction factor for the next control action. By this way, a ILC can minimize the tracking error within a limited number of iterations. In this study, a Stewart Platform is built to implement tracking control experiments. The kinematic equations of the Stewart Platform are found by considering the relationship between the center of the upper-plate, which has six degrees of freedom, and six hydraulic legs. The extension lengths obtained by solving the kinematic equations of the Stewart Platform are then used as reference inputs for tracking control of the six hydraulic legs. By controlling extension lengths of the six hydraulic legs of the Stewart Platform, we can force the center of the upper-plate to follow a given trajectory. In our study, a ILC is used to improve tracking errors of the six hydraulic legs of a Stewart Platform. A PD-typed ILC with delay parameters are also used to control the upper-plate of the Stewart Platform to follow a repeated path until the tracking errors are minimized. We also propose a system identification scheme to identify our plant and to find the transfer function of the system. This transfer function is then used to yield the time histories of the system and to design controller. Finally, experiment results are verified by simulations. We can find out results in path tracking of experiment differing from results in path tracking of simulation. Basically, all errors are in acceptable region, and we can know from the data of experiment the larger amplitude, the slower error converging.



Keywords : Stewart Platform, hydraulic, ILC


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