兩軸伺服機構交叉耦合控制

In this research, we implement control algorithms on DSP-based controller to simultaneously control both axes of a feed drive servomechanism. The two-axis servomechanism is modeled as a single system with multiple variables. The dynamic equation of each axis is related by a cross-coupled relationship. The objective of this research is to improve contour errors of the two-axis servomechanism with a cross-coupled controller. In the situation of low speed or small variation of velocity, a PID controller provides satisfactory accuracy. Experimental results show that there is no significant difference in contour errors between the PID controller and the cross-coupled controller in the cases of line contours. On the other hand, in the situation of high speed or large variation of velocity , experimental results present large contour error in circular contour by using a PID controller. A significant reduction of contour error is achieved by inserting a cross-coupled controller between two axes. The controller is constructed on a DSP controlled two-axis servomechanism and compared to uncoupled controllers. The improvement of contour accuracy has the potential of application in manufacturing processes such as high speed and precision machining.