EXPERIMENTAL BACKLASH STUDY IN MECHANICAL MANIPULATORS

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The behavior of mechanical manipulators with backlash is analyzed. In order to acquire and study the signals an experimental setup is implemented. The signal processing capabilities of the wavelets are used for de-noising the experimental signals and the energy of the obtained components is analyzed. To evaluate the backlash effect upon the robotic system is proposed an index based on the phase pseudo plane. Several tests are developed that demonstrate the coherence of the results.

1. Introduction

Robotic systems have nonlinearities in the actuators that include deadzone, backlash and saturation. This problem is particularly important in robotic manipulation where a high precision is needed. In fact, the backlash is one of the most important non-linearities that limit the performance of the mechanical manipulators. This dynamic phenomenon has been an area of active research, but due to its complexity well established conclusions are still lacking.

The backlash in robotic systems has two main aspects: the identification and the control. Several authors addressed the problem of identification [1], [2], [3], [4], [5], [6]. Dagalakis and Myers [1] proposed a technique based on the coherence function to detect backlash in robotic systems. Another