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Estimation of the External Force for a Co-Manipulation Task Using the Drive Chain Robot

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Abstract : The aim of this paper is to show that the observation of the external effort and the sensor-less control of a system is limited by the mechanical system. First, the model of a one-joint robot with a prismatic joint is presented. Based on this model, two different procedures were performed in order to identify the mechanical parameters of the system and observe the external effort applied on it. Experiments have proven that the accuracy of the force observer, based on the DC motor current, is limited by the mechanics of the robot. The sensor-less control will be limited by the accuracy in estimation of the mechanical parameters and by the maximum static friction force, that is the minimum force which can be observed in this case. The consequence of this limitation is that industrial robots without specific design are not well adapted to perform sensor-less precision tasks. Finally, an efficient control law is presented for high effort applications.

Keywords : control, identification, robot, co-manipulation, sensor-less
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