Abstract

In this research, impact force control of robotic manipulators was proposed. Preliminary study in contact transition problems was implemented on a testbed of 1 degree of freedom robot arm. The impulse equation based on triangular pulse shape was integrated into an impact modeling. There are three stages of the impact process, i.e. pre-collision, impact and post-collision stages. The contact transition controlled by using switching method is proposed. A peak force during the impact is quantified based on the parameters during the pre-collision stage. The properly bounded parameters lead to smooth and stable transitions during the stage switching. The extension of this method to A255 CRS industrial robot, which is 5 degree of freedom remotely driven robot, is also carried out. The state feedback linearization was used to control each stage. The results showed that there was a residential peak force during the impact process. The chattering was solved. Adding passive compliance at the end-effector is proposed to reduce an impulse peak force. The results showed the decreasing in impulse peak force. The robot with passive compliance attached at the tool tip is anticipated to has smaller impulse force when the robot reaches a workpiece.