



Estimation of Time-varying Human Arm Stiffness Using Electromyogram Signal

Mohammad Ali Ahmadi-Pajouh ^{a,b}, Farzad Towhidkhan ^a, Mh Moradi ^a

^a Amirkabir University of Technology, Tehran, Iran; ^b K. N. Toosi University of Technology, Tehran, Iran

Human arm stiffness is important in movement stability in unstable or novel environments. Therefore measurement of the arm stiffness is necessary to study on control mechanisms involved in stabilization and adaptation to environments dynamics. Previous techniques, did not measure time-varying stiffness explicitly. Here we introduce a novel method to estimate arm stiffness using EMG signals. In this method, muscles activation levels are related to joints torques and stiffness. We derived analytical relations to calculate arm stiffness using joints dynamics. This method was used to find arm stiffness profile in 12 subjects, before a reaching movement task. Results imply that this method can be used to find time-varying profile of the arm stiffness.