ABSTRACT

The kinematic analysis of multi-degree of freedom robotic manipulators has been carried out for forward and inverse kinematics. Denavit-Hartenberg (D-H) convention is used to model the joints of robotic manipulator. The inverse kinematic analysis has been carried out by analytical and ANFIS methods. The calculation of inverse kinematics solutions is complex and time-consuming task due to the nonexistence of unique solution. From the literature review, it can be seen that the difficulties of traditional approach to calculate inverse kinematic solutions can be avoided by using artificial intelligent techniques, which gives an advantage of fast computation. In the present work, the forward and inverse kinematics of 3-DOF and 5-DOF robotic manipulators has been done. An artificial intelligent technique called ANFIS method has been used to obtain inverse kinematic solutions for both the used robotic manipulators. Two different membership functions have been used with ANFIS method and a comparative analysis based on performance has been shown. Experiments have been done for desired trajectories viz. ‘straight line’ and ‘circle’ for 3-DOF and 5-DOF robotic manipulators. Comparisons have been given for analytical technique, ANFIS method and experiments. It was found that the analytical results and ANFIS method results are in reasonable agreement with each other while the experimental results were based upon the respective link movement of robotic manipulators.