1. INTRODUCTION

Flexible manipulators have several advantages over rigid robots: they require less material, are lighter in weight, consume less power, require smaller actuators, are more maneuverable and transportable, have less overall cost and higher payload to robot weight ratio [1]. These types of robots are used in a wide spectrum of applications starting from simple pick and place operations of an industrial robot to micro-surgery, maintenance of nuclear plants and space robotics [2].

Due to the flexible nature of the system, the dynamics are highly non-linear and complex. Problems arise due to lack of sensing, vibration due to system flexibility, imprecise positional accuracy and the difficulty in obtaining accurate model for the system [3]. Moreover, the complexity of this problem increases when the flexible manipulator carries a payload.
Practically, a robot is required to perform a single or sequential task such as to pick up a payload, move to a specified location or along a pre-planned trajectory and place the payload.

4. CONCLUSION

The development of dynamic model and a RBFNN controller of a two-link flexible manipulator incorporating structural damping, hub inertia and payload have been presented. The model has been developed using a combined AMM and Euler-Lagrange approach. The RBFNN controller is efficient and easy to carry on. The RBFNN controller used has better then PID controller, as it can assume very different type of trajectory with training the controller for it. Simulations of the dynamic model have been carried out in the time where the system responses including angular positions, modal displacements and end-point acceleration are studied. The results show that the performance of the control system is improved greatly with the proposed controller, greatly decreasing the tip deflection of the second link and also enhancing the steady state accuracy for both links. Simulation results have shown that significant vibration occurs during movement of the system. It is found that the payload significantly affected the system behaviour in time response.

REFERENCES


