

MODELLING AND CONTROL OF A TWO-LINK FLEXIBLE MANIPULATOR

M. Khairudin¹, Z. Mohammed², Subianto³

¹Electrical Engineering Dept. Universitas Negeri Yogyakarta, Yogyakarta 55281, Indonesia

²Electrical Engineering Faculty, Universiti Teknologi Malaysia, UTM Skudai 81310, Malaysia

³Department of Electrical, Electronics and Systems Engineering, UKM 43600 Selangor D.E.,
Malaysia

moh_khairudin@uny.ac.id

ABSTRACT

The paper presents dynamic modelling of a two-link flexible manipulator model. An explicit, complete, and accurate nonlinear dynamic model of the system is developed using assumed mode method. The Lagrangian approach is used to derive the dynamic model of the structure. PD controller makes a response of angle link-1 and link-2 more than better for another method. PD controller will implement to the system of a Two-link Flexible Manipulator.

Keywords; assumed method; dynamic model; Lagrangian; PD controller.

INTRODUCTION

Flexible robot manipulators 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. Unlike rigid manipulators, the dynamics of manipulators incorporate the effects of mechanical flexibilities in its links. Link flexibility is a consequence of the lightweight constructional feature in the manipulator arms that are designed to operate at high speed with low inertia. Thus, flexible manipulators undergo two types of motion, i.e. rigid and flexible motion.

Partial Differential Equations and boundary equations of a two-link flexible manipulator system are obtained by matching the shear force and bending moment at the elbow joint,