

MATHEMATICAL MODEL ANALYSIS AND CONTROL ALGORITHMS DESIGN BASED ON STATE FEEDBACK METHOD OF ROTARY INVERTED PENDULUM

IRFAN JAMIL¹, REHAN JAMIL², ZHAO JINQUAN³, RIZWAN JAMIL⁴ & ABDUS SAMEE⁵

^{1,4}College of Energy and Electrical Engineering Hohai University, Nanjing, China

²School of Physics & Electronic Information, Yunnan Normal University, Kunming, China

³Heavy Mechanical Complex (HMC-3) Taxila, Pakistan

⁵Chasma Center of Nuclear Training, PEAC, Islamabad, Pakistan

ABSTRACT

XZ- II type rotary inverted pendulum is a typical mechatronic system; it completes real-time motion control using DSP motion controller and motor torque. In this paper, we recognize XZ- II rotational inverted pendulum and learn system composition, working principle, using method, precautions and software platform. We master how to build mathematical model and state feedback control method (pole assignment algorithm) of the one order rotational inverted pendulum system and finish simulation study of system using Matlab. In the end we grasp debugging method of the actual system, and finish online control of the one order rotational inverted pendulum system as well.

KEYWORDS: Rotational Inverted Pudulem, Mathematical Model, State Feedback, Simulation, Debugging