



## OUTPUT BASED INPUT SHAPING FOR OPTIMAL CONTROL OF SINGLE LINK FLEXIBLE MANIPULATOR

Nura Musa Tahir<sup>1,2</sup>, Sabo Miya Hassan<sup>1\*</sup>, Zaharuddin Mohamed<sup>2</sup> and Ahmed Garba Ibrahim<sup>1</sup>.

<sup>1</sup>Faculty of Engineering, Abubakar Tafawa Balewa University, PMB 0248, Bauchi, Nigeria

<sup>2</sup>Faculty of Electrical Engineering, Universiti Teknologi Malaysia, 81310 UTM, Johor, Malaysia

Emails: [\\*hsmiya2010@gmail.com](mailto:*hsmiya2010@gmail.com), [nuratahir@gmail.com](mailto:nuratahir@gmail.com)

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*Abstract- Endpoint residual vibrations and oscillations due to flexible and rigid body motions are big challenges in control of single link flexible manipulators, it makes positioning of payload difficult especially when using various payloads. This paper present output based input shaping with two different control algorithms for optimal control of single link flexible manipulators. Output based filter (OBF) is designed using the signal output of the system and then incorporated with both linear quadratic regulator (LQR) and PID separately for position and residual vibration control. The Robustness of these control algorithms are tested by changing the payloads from 0g to 30g, 50g and 70g in each case. Based on MATLAB simulation results and time response analysis, LQR-OBF outperformed the PID-OBF in both tracking and vibration reduction.*

**Index terms:** Single link flexible manipulator, residual vibrations, input shaping, linear quadratic regulator (LQR), PID controller, optimal control.