

Phalakorn Kladjaroen 2014: Vibration Suppression of Flexible Robot based on Resonance Ratio Control with Coefficient Diagram Method. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering. Thesis Advisor: Mr. Chowarit Mitsantisuk, D.Eng. 61 pages.

Generally, the industrial machine and robot manipulator with the flexible tool is used in many applications, such as the high-resolution milling and the complex surgery. The force sensors are used to measure the external force, which is the force feedback in the force control. However, the force sensor has too many disadvantages, for example, the noise and the limit bandwidth. To solve these problems, a disturbance observer (DOB) is used to estimate the external force, but it is not work in more than one-mass system. Because the external force entered multi-mass system on the load side. So a multi-encoder based on disturbance observer (MEDOB) is used to estimate the external force in the flexible robot.

In multi-mass system, it consists many mass connected by the flexible structure that made the vibration in the system. A resonance ratio control is applied to suppress the vibration in the system, because the conventional controller cannot control this system. Then, the optimum control parameters of the resonance ratio control is designed by a coefficient diagram method (CDM) for the robustness of the system. In addition, the bilateral control will have the best performance if the vibration does not occur in the system and the estimate of force is precise and accurate.

The effectiveness of this method is verified by numerical simulation results. By using the proposed method, the vibration effect can be rejected very successfully in the flexible robot system. In addition, the force and position responses of this method is better than the conventional methods.

---

Student's signature

---

Thesis Advisor's signature