

Investigation on Fluid Induced Vibration of the Flexible Robot Arm

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Abstract

In this paper the vibration of robot arm induced by fluid flow is investigated. Considering the flexibility of robot arm and the force of around fluid, the equation of motion is obtained using the Euler-Bernoulli beam theory. The force on the arm by the fluid is applied by coupled-motion model. After extracting the differential equations, the effect of system parameters such as geometrical and mechanical characteristic of arm, the effect of fluid velocity on the dynamic response of the arm are investigated. Results show that by increasing the velocity of the fluid, the inertial forces of fluid increase and thus are not negligible. This case leads to suddenly increase in the vibration and results in weak performance of the system in the case of high velocity and in locked-in zone. Therefore, by identifying the locked-in zone, the parameters of system should be chosen in a way that the arm not to be in the locked-in zone.

Keywords: Robot Arm, Fluid Induced Vibration, Locked-in Phenomenon.