

Designing a 2-degree of freedom model of an unbalanced engine and reducing its vibrations by active control

M. Mohebbi, author

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Abstrak

In this paper, a 2-degree of freedom dynamic model of an unbalanced rotary engine is designed, in a manner that has the effect of modal coupling. After designing the dynamic model in order to reduce the vibrations generated due to the unbalancing mass and modal coupling, the active force control (AFC) method is implemented along with a conventional proportional integral derivative (PID) controller with linear actuators, meaning that the AFC loop is applied as a supplement to the conventional PID controller. The obtained results show that, when the AFC loop was engaged with the PID controller, the vibrations were reduced to nearly zero in both aspects of frequency and amplitude when compared to the case in which only a PID controller was operating in the control system.