FINAL PROJECT

EXPERIMENTAL STUDY OF THE NOSE LANDING GEAR STIFFNESS AND MASS VARIATION ON THE ACCELERATION RESPONSE AMPLITUDE

This Final Project is Submitted to The Mechanical Engineering Department of Andalas University in Partial Fulfillment of The Requirement for The Degree of Sarjana Teknik (S.T)

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ABSTRACT

This research is conducted to evaluate the landing gear performance in reducing the impact of vibration response during landing. Evaluation is performed by varying the system stiffness and mass. The landing gear used is the result of a design created using commercial software, Inventor Professional 2017. Load shock or impact force arising during the landing process can cause damage to the landing gear components. To reduce the shock load or impact force on the landing gear during the landing process, an effective alternative technique is needed to reduce the vibration response. One of technique that can be used is by using soft landing gear system. However, the soft landing gear system is limited by the maximum displacement and its performance reduce during resonance.

In this research, the effect of stiffness and mass variation to the landing gear response is analysed to obtain the data in observing the maximum acceleration of landing gear, an experiment with two methods was conducted. The first method by using spring k = 29N/mm and k = 215N/mm without mass addition. The second method using spring k = 215N/mm with 1 kg mass addition for three times. The landing gear is raised with height 5 cm and dropped. The experiment gave an output in the form of an acceleration response from landing gear using commercial software LabVIEW®2016. The accelerometer sensor mounted on the landing gear will send an electrical signal to the amplifier and then forwarded to the national instrument and the output is displayed on a personal computer.

The test results show that landing gear using a spring k = 29N/mm has a lower maximum acceleration than spring k = 215N/mm. Conversely, the damping ratio of spring k = 29N/mm is greater than the spring k = 215N/mm. Natural frequency is inversely proportional to mass and directly proportional to stiffness.

Keywords : landing gear, vibration isolator, semi active spring, maximum acceleration, damping ratio, natural frequency.