

TUGAS AKHIR

**KAJI EKSPERIMENTAL PENINGKATAN FREKUENSI PRIBADI PADA
PESAWAT TANPA AWAK TIPE *FIXED WING* DENGAN
PENAMBAHAN SPAR PROFIL T**

**Diajukan Sebagai Salah Satu Syarat Untuk Menyelesaikan
Pendidikan Tahap Sarjana**



Oleh

HANCES FERNANDESZ

NBP: 1710912019

Dosen Pembimbing :

Dr. Eng. Lovely Son

Dr. Eng. Eka Satria

JURUSAN TEKNIK MESIN

FAKULTAS TEKNIK

UNIVERSITAS ANDALAS

PADANG

2022

ABSTRACT

In testing the structure of the unmanned aerial vehicle (UAV) under dynamic loading, the main factors that influence it include natural frequency, vibration mode and vibration response. The dynamic loading shown by the aircraft enhances the interaction of rigid body dynamics and structural vibration modes. If the dynamic loading that occurs is close to the natural frequency of the aircraft wing structure, there will be flutter or resonance on the wing which makes the amplitude of the vibrations on the wings increase, causing damage to the vehicle. To avoid this condition, it is possible to increase the rigidity of the aircraft structure with the addition of a T-profile stiffener spar, so that the natural frequency value also increases. Previous research has simulated that, the more optimum stiffener spar in increasing the stiffness of the structure without experiencing a significant increase in mass is the T profile stiffener spar.

This research was carried out experimentally on fixed wing type unmanned aerial vehicle (UAV) with the addition of T profile spars. The main objective of this final project is to create an aircraft model with the addition of T profile spars and obtain natural frequency values experimentally. Besides that, it also gets the vibration response and the shape of the vibration mode from the aircraft structure. After that, the results of these tests are compared with the results without the addition of T profile spars. In this final project, the first to fifth natural frequency values of the aircraft structure based on the test results are 74.01 Hz, 112 Hz, 216 Hz, 244 Hz and 277 Hz. The natural frequency error values from the simulation test results are 1.78%, 3.60%, 5.48%, 5.80%, and 0.98%. The results of the nodal vibration response indicate that the amplitude of the aircraft with T-profile spars is smaller than the aircraft without T-profile spars.

Keywords: flutter, T profile spar, natural frequency, amplitude, stiffness, vibration response, nodal.