Static and Dynamic Stability Analysis on the Lateral Directional STTA-12 MXA's Aircraft

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ABSTRACT

The stability of an aircraft is very important in aircraft design. The stability analysis of the aircraft is aim to determine the static and dynamic stability of the aircraft. It consists of static stability of the lateral, the directional, the crosswind criterion, the spin recovery criteria, the dynamic stability and the flying qualities.

Stability analysis of the lateral directional is using digital datcom. Digital datcom software will provide the output of aerodynamic parameters such as Cl, Cn, Cy and derivatives. The aerodynamic parameters are then processed using calculation software such as Ms. Excel, mathlab and mathcad are used to view STTA-12 MXA stability.

The calculation results for static stability of the lateral directional is stable, because the value of Clβ = -0,00003 / deg and Cnβ = 0,0862 / deg. In dynamic stability is stable, because the eigenvalues are on the left of the imaginary axis (roll and dutch roll), while for the spiral is on the right of the imaginary axis but its value close to zero. Flying quality is at level 1 which means it is clearly adequate for aircraft flying category. The crosswind criteria were performed at takeoff and landing at some altitudes consist of sea level, 7,054 ft and 14,219 ft and using only 80 percent rudder deflection. The result on landing accomplishes with the rudder deflection criteria, while the sea level takeoff does not accomplishes the criteria and its solution adds to the use of rudder deflection. The spin recovery criteria accomplishes the criteria with the availability of rudder deflection when the angle of attack's more than 50 degrees.

Keywords : Lateral-Directional, Digital Datcom, Stability of Aircraft.

Analisis Kestabilan Statis dan Dinamis pada Matra Lateral Direksional Pesawat STTA-12 MXA

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ABSTRAK

Kestabilan pesawat terbang merupakan aspek penting dalam merancang pesawat terbang. Analisis kestabilan pesawat terbang yang dilakukan bertujuan untuk mengetahui kestabilan statis dan dinamis pesawat. Yang terdiri dari kestabilan statis matra lateral, matra direksional, kriteria crosswind, kriteria spin recovery, kestabilan dinamis dan kualitas terbang.

Analisis kestabilan matra lateral direksional dilakukan menggunakan software digital datcom. Software digital datcom akan memberikan output berupa parameter aerodinamik seperti Cl, Cn, Cy dan turunannya. Parameter aerodinamik kemudian diproses menggunakan bantuan software perhitungan seperti Ms. Excel, mathlab dan mathcad yang digunakan untuk melihat kestabilan pesawat STTA-12 MXA.

Hasil perhitungan untuk kestabilan statis matra lateral direksional stabil karena nilai Cl_β = -0,00003/deg dan Cn_β = 0,0862/deg. Pada kestabilan dinamis stabil karena akar karakteristik berada pada sebelah kiri sumbu imajiner (roll dan dutch roll), sedangkan untuk spiral nilai akarnya berada disebelah kanan namun nilai nya mendekati nol. Kualitas penerbangan berada pada level 1 yang artinya jelas memadai untuk kategori terbang pesawat. Kriteria crosswind dilakukan saat takeoff dan landing pada beberapa ketinggian yaitu sea level, 7.054 ft dan 14.219 ft dengan hanya menggunakan 80 persen defleksi rudder. Hasilnya adalah landing memenuhi kriteria defleksi rudder, sedangkan takeoff saat sea level tidak memenuhi kriteria dan solusi nya menambah penggunaan defleksi rudder. Kriteria spin recovery memenuhi kriteria dengan tersedianya defleksi rudder saat sudut serang sebesar 50 derajat.

Kata Kunci : Lateral-Direksional, Digital Datcom, Kestabilan Pesawat.