SIAE – 2014

Flying Qualities examination. Text in English for Su Hang

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Duration : 2H
Documents and calculators are not authorized.

1°) Cmα

a) What does Cmα represent?
b) Why this coefficient is important for the study of Handling Qualities?
c) Which are the points of the airplane associated with this coefficient ?
d) What has to be modified on the airplane to change this coefficient ?

2°) Turn

In this exercise, we will neglect Czδm, Cyδn, Clδn, Cnδl.
We will assume that the airplane is longitudinally stable.
We will also assume that pitch attitude is small.

a) Is it better to turn with a null bank angle ϕ or not ? Why ?
b) The aircraft performs a correct turn at 2g load factor. Compute the lateral load factor.
c) What is the name of the equation allowing to compute the angle of attack during this turn?
d) Provide the expression allowing to compute this angle of attack, function of the flight parameters.
e) What is the name of the equation allowing to compute the elevator deflection.
f) We will assume that, before the turn, the airplane is trimmed and therefore the elevator is at null position. During the turn, the pitch trim position will not be modified. Provide the expression allowing to compute the elevator deflection during the stabilised turn.
g) In which direction is deflected the stick (longitudinally) ? Why?
h) Provide the expression allowing to compute the yaw rate during the turn.
i) What is the name of the equation allowing to compute the ailerons deflection
j) Provide the expression allowing to compute this deflection
k) In which direction is deflected the stick (laterally) ? Why?
l) What is the name of the equation allowing to compute the rudder deflection?
m) Provide the expression allowing to compute this deflection.
n) In which direction is deflected the rudder pedals ? Why?
o) How can we know if this airplane is spirally stable ?
p) This airplane flies in approach at 1.23 Vs1g. Is it able to perform a turn at 2g load factor? Why?