

NACA 0012

U_mag = 135 m/s

tgt: find Alpha such that Valarezo condition of max lift is met
description: pressure distribution is used to correct the course model from the pressure distribution is possible to compute the max suction of the airfoil, the optimization aim to find the condition in which the suction is closest to the value of -14 without exceeding it

- the course solver uses Hess-Smith to compute the pressure distribution P_HS
- the fine solver uses Xfoil in viscous configuration to compute P_XF
- the course method is corrected through a linear operator such that:

$$P_HS_corr(x) = P_XF(x_c) + Skf * (P_HS(x) - P_HS(x_c));$$

Optimization Cycle X = alpha

Set the Cycle P_XF(x_c) e P_HS(x_c) set to be zero*
Skf set to be eye

* in the first iteration
P_HS is not corrected

WHILE iter < iter_max & err > toll

Course Optimization

- > fmincon
- > $c(x) = 14 - \Delta(P_HS_CORR(x))$
- > Delta is obtained from P_HS_CORR(x)
- > nonlinear constrain is set to prevent $c(x) > 14$
- > MaxFunctionEvaluations = 50
- > OptimalityTolerance = 0.005
- > FunctionTolerance = 0.005
- > StepTolerance = 0.01

-> x_c = risultato opt

Fine computation at x = x_c
> viscous; Re = 9M

Error Assessment

> Err = abs(P_XF(x_c) - P_HS_corr(x_c))

Computation of the correction Matrix

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