

Project 2

Mauro Patimo

I. Nomenclature

f = equation introduced in similarity solution
 η = variable introduced in similarity solution to relate y and x

II. Introduction

Falkner-Skan equations are a set of nonlinear differential equations that describe the flow of a viscous, incompressible fluid over a flat plate. The equations are a generalization of the Blasius equation, which is obtained by setting the pressure gradient to zero.

The following paper will present a numerical solution to the Falkner-Skan equations for different values of the parameter β .

III. Procedure

The equations are:

$$f''' + f f'' + \beta(1 - f'^2) = 0 \quad (1)$$

With the following boundary conditions:

$$f(0) = f'(0) = 0, \quad f'(\infty) = 1 \quad (2)$$

IV. Results

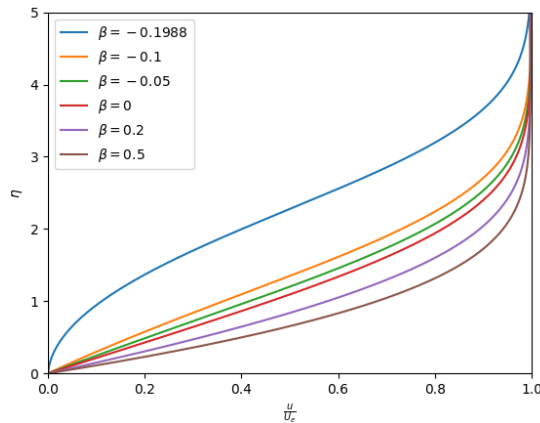


Fig. 1 Falkner-Skan flow for different betas

β	$\frac{\theta}{g(x)}$	$c_f Re \theta$
-0.1988	0.585988	0.0445351
-0.1	0.514918	0.328518
-0.05	0.49022	0.392176
0	0.469	0.439922
0.2	0.406751	0.558062
0.5	0.347107	0.643536

V. Conclusion

Additional work has been done to solve the Falkner-Skan equations for different values of β .

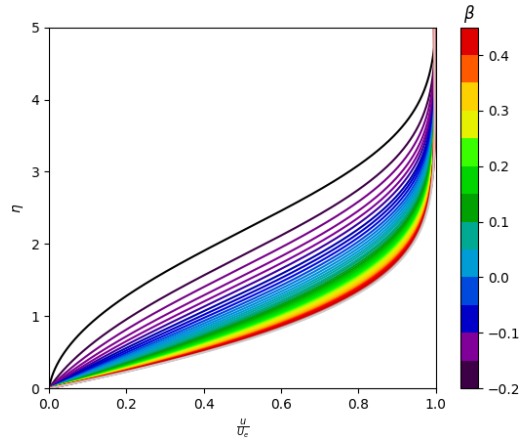


Fig. 2 Falkner-Skan flow for different betas