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:

$$f''' + f f'' + \beta(1 - f'^2) = 0 \tag{1}$$

With the following boundary conditions:

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

The equations are solved numerically using the shooting method.

IV. Results

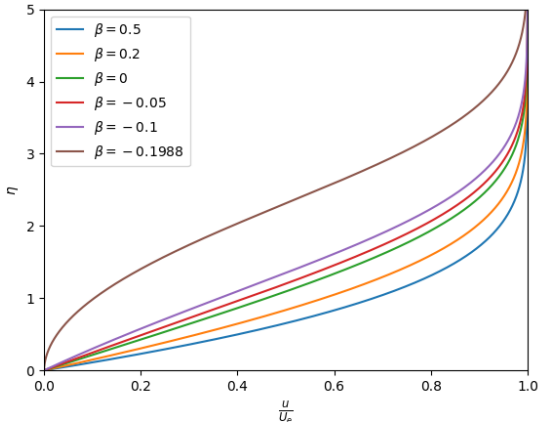

Fig. 1 Falkner-Skan flow for different betas

β	$\frac{\theta}{g(x)}$	$c_f Re_\theta$	H
0.5	0.350299	0.649846	2.2958
0.2	0.408342	0.560824	2.40849
0	0.469342	0.440563	2.59369
-0.05	0.490107	0.392059	2.67814
-0.1	0.514655	0.328216	2.80418
-0.1988	0.575706	0.00547205	3.98866

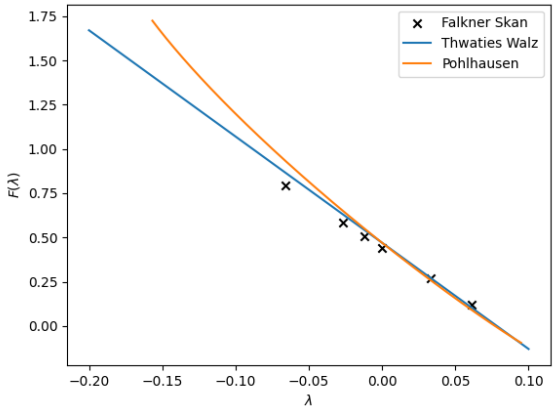

Fig. 2 Different profile methods

V. Conclusion

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

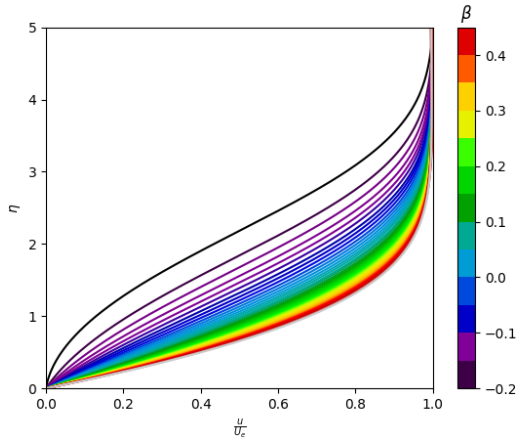

Fig. 3 Falkner-Skan flow for different betas