A&AE 624 Laminar-Turbulent Transition
Spring 2025
Professor Steve Schneider
Final Project
Written Report Due: Monday, 5 May, 8:00am U.S. Eastern Time
Oral Progress Reports are to be Scheduled During the Week of 31 March
Oral Summary Reports may be Scheduled During the Last Week of Class
Revision 0, 14 Jan. 2025

For AAE624, 3/4 of the grade is made up of this project. Please send me an email with your ideas for what you'd like to do, or set up a time to talk to me on the phone. It's also good to have discussions in the hall after class. After discussion, please submit a one-page plan for my approval before beginning work.

The first option is to do computations using a stability-based scheme such as the e^N method. Estimate stability and/or transition in a flow of your choice. Compare your results to available data. I have data for various configurations: 2D, axisymmetric, and 3D. Note that each code and analysis method will have its own limitations. Your report should describe the details of your prediction method, and convey a clear understanding of the stability characteristics of the flow.

Some options for the computer project include running:

1. The codes in the Cebeci book. I also have two earlier books by Cebeci that include stability codes for e**N type prediction methods.

2. The ORRSOM code that computes TS waves for incompressible flow (code from Reynolds via Blaisdell)

3. The OSX code that uses ORRSOM and approx. to compute TS waves along an airfoil. (adapted by earlier students)

4. Koochesfahani's inviscid instability code for wake profiles

5. Xuming Su's finite-difference TS solver

For all of these we have the Fortran source code, which you would have to learn, understand, modify, and use to compare to some test case. I am open to other possibilities. Some students may have access to other stability codes such as LASTRAC or STABL which they may wish to use.

The second option is to do a literature review. You may also combine some of both options.

Oral progress reports are to be scheduled, virtually and one-on-one, during the week of 31 March, near the half-way mark. This is to ensure that students are making good progress on their projects, and have a good understanding of instructor expectations.