TSFOIL Analysis Interface Module (AIM)

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0.1 Introduction

0.1.1 TSFOIL AIM Overview

A module in the Computational Aircraft Prototype Syntheses (CAPS) has been developed to interact (through input files) with the transonic airfoil analysis tool TSFOIL. TSFOIL can be downloaded from http://www.dept.aoe.vt.edu/~mason/Mason_f/MRsoft.html .

Note: In the tsfoil2.f file is may be necessary to comment out line 38 - "USE DFPORT"

An outline of the AIM's inputs and outputs are provided in AIM Inputs and AIM Outputs, respectively.

Upon running preAnalysis the AIM generates two files: 1. "tsfoilInput.txt" which contains instructions for TSFOIL to execute and 2. "caps.tsfoil" which contains the geometry to be analyzed.

0.1.2 Assumptions

TSFOIL inherently assumes the airfoil cross-section is in the x-y plane, if it isn't an attempt is made to automatically rotate the provided body.

0.2 AIM Inputs

The following list outlines the TSFOIL inputs along with their default values available through the AIM interface.

- **Mach = 0.75**
  Mach number. Valid range for TSFOIL is 0.5 to 2.0 .
- **Re = 0.0**
  Reynolds number based on chord length.
- **Alpha = 0.0**
  Angle of attack [degree].

0.3 AIM Outputs

The following list outlines the TSFOIL outputs available through the AIM interface.

- **CL =** Coefficient of lift value.
- **CD =** Coefficient of drag value. (Calculated from momentum integral)
- **CD_Wave =** Wave drag coefficient value.
- **CM =** Moment coefficient value.
- **Cp_Critical =** Critical pressure coefficient (M = 1).