

TSFOIL Analysis Interface Module (AIM)

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1 Introduction

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.ae.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.

The accepted and expected geometric representation and analysis intentions are detailed in [Geometry Representation and Analysis Intent](#).

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.

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.

2 Geometry Representation and Analysis Intent

The geometric representation for the TSFOIL AIM requires the airfoil cross-section, though the global attribute capsIntent, be set to ALL or LINEARAERO.

3 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].

4 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 ($M = 1$).