TSFOIL Analysis Interface Module (AIM)

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Contents

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.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).