Computational Fluid Dynamics

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Introduction

Non-Turbulent Flow

Reynold's-Averaged Navier-Stokes

Spalart-Allmaras Turbulence

SU^2 Code

Mesh and Numerics

Scripting and Automation

Throughout this project Wolfram Mathematica 10.1.0 for Linux x86 was used to sift through the vast data files and extract the relevant information to produce the plots. The SU^2 code natively writes to the data files in the format used for Tecplot, a visualization and analysis tool for computational fluid dynamics [**?**]. Since Tecplot was not used, a Wolfram function was needed to convert the data to a form Mathematica could use. Once the data was in a usable form, the `ListDensityPlot` function was used to create the images. The function to tidy the data along with the plotting function were combined into a Wolfram script such as Figure **??**, which can be executed from the terminal. To fully automate the image generation, a shell script was written to iterate over each data file.

Airfoil

Static Cylinder

Vortex Shedding

Conclusion