My Project

Generated by Doxygen 1.9.3

Chapter 1

Tracked Quantities

1.1 Mach Number

1.1.1 Mach Number is important because it informs the oblique shock wave angle

1.2 Static Pressure

1.2.1 It is important to know the static pressure at the start of the compression cowl and the static pressure at the end of the cowl so that we can determine stagnation pressure loss using the isentropic solutions and that is an important design performance metric

1.3 Static Temperature

1.3.1 Potentially useful when considering the inlet to the compressor and combustor

1.4 Loop Dependent Variables:

1.4.1 current position

1.4.2 current angle

1.4.3 old angle theta

1.4.4 new angle theta

1.4.5 Turn Angle of the Ramp

1.4.6 Gradient of the Ramp

1.4.7 True Mach Number Before Shock

1.4.8 Mach Normal to Shock Before

1.4.9 Mach Nromal to Shock After

1.4.10 True Mach Number After Shock

1.4.11 dx

1.5 Needed Functionality:

1.5.1 Find Angle between two points

1.5.2 From Angle determine gradient

1.5.3 Given gradient and dl determine dx

1.6 Algorithm Plan:

1.6.1 Have an initial position in x and y

1.6.2 Have the coordinates of the cowl

1.6.3.1.2 Set the old angle theta as the new angle theta from last iteration

1.6.3.2 Find the angle of the line between the cowl and the current position

1.6.3.2.1 update current angle

1.6.3.3 Compute the Mach number normal to shock

1.6.3.3.1 Use the Explicit Equation

1.6.3.3.2 update Mach Normal to Shock Before

1.6.3.4 Use Shock Jump relations for normal Mach number and all relevant quantities

1.6.3.4.1 Update Mach Normal to Shock After

1.6.3.5 Compute the turn angle of the ramp

1.6.3.5.1 Use Explicit Equation and plug in shock angle

1.6.3.5.2 update turn angle of ramp

1.6.3.6 Compute new true Mach number

1.6.3.6.1 Update True Mach Number After Shock

1.6.3.7 Find Gradient of current ramp

1.6.3.7.1 new angle theta is the old + turn angle

1.6.3.7.2 Use Basic Trigonometry to compute current gradient of ramp

1.6.3.7.3 Update Value of the gradient of ramp

1.6.3.8 Compute value of dx

1.6.3.8.1 Update Value of dx

1.6.3.9 Take one small "step" forward assuming straight line (update current position)

1.6.3.9.1 From Gradient of the Ramp and current position,

increment x by dx

increment y by gradient x dx

1.6.3.10 Log position and probably more quantities of interest

1.7 Programming Standards:

1.7.1 Do not use printf for printing. Let us all be consistent and use iostream and their inherited class system

1.7.2 Do not edit main directly or tamper with the variable declarations. Do your individual testing in "Testing"

1.7.3 Do not use "using namespace as std" instead spell out std:: this is to avoid ambiguity in namespaces

Chapter 2

File Index

2.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 3

File Documentation

3.1 Header.h

```
1 //Include Guards
2 #ifndef Comp_Ramp
3 #define Comp_Ramp
4
5 //Library Includes
6 #include <iostream>
7 #include <fstream>
8 #include <cmath>
9
10 //File Naming
11 #define XFileName "XRamp.txt"
12 #define YFileName "YRamp.txt"
13 #define ParamName "Parameter.txt"
14
15
16 //Variable Prototypes
17 extern std::ofstream XRmpOut;
18 extern std::ofstream YRmpOut;
19 extern double gam;
20 extern double xo;
21 extern double yo;
22 extern double xcowl;
23 extern double ycowl;
24 extern int Iter;
25 extern double dl;
26 extern double dx;
27 extern double xc;
28 extern double yc;
29 extern double AngCowl;
30 extern double Oalp;
31 extern double Nalp;
32 extern double RmpGrad;
33 extern double theta;
34 extern double M1;
35 extern double Mn1;
36 extern double M2;
37 extern double Mn2;
38
39
40 //Function Prototypes
41
42 //Init.cpp
43 void Initialize();
44
45 //IO.cpp
46 void SetupFiles();
47 void CloseFiles();
48 void ParPrint();
49
50 //Geometry.cpp
51 double Pnts2Ang(double, double, double, double);
52 double Ang2Grad(double);
53 double dxComp(double);
54
55 //Gen_Rmp_Geo.cpp
56 void XMarch();
57 void GenRamp();
58
```

```
59 //Shock.cpp
60 double MachNormal(double, double);
61 double ShockMach(double);
62 double beta2theta(double, double);
63 double MachTrue(double, double, double);
64
65
66 #endif
```