

Spike Injector Geometry

Injector port Area, cm²
105.594

Total Throat Flow Area
1267.13

Port Spacing on Spike, deg.
30

Gap between Ports, cm
29.47

collected port diameters
139.141

Cowl Lip Mach Number
1

Geometric Aerospike
15.2503

actual Cowl Height
2.4651

Gamma
1.222

MWght, kg/kg-mol
21.28

of points along spike
1500

% truncation
77.1683

Operating Conditions

PO, kPa
5161.41

TO, K
3455

Pa, kPa
0.01

Draw Spike Mach Lines? to Cowl Lip
no

Draw Spike Mach Lines? to Expansion Line?
no

thin factor for mach lines
100

Injector port diameter
11.5951

Radius of Cowl Upper Lip from CL, cm
78.4285

Number of Ports
12

Port CL, Exit Angle, deg
12.275

Cowl Exit Properties

Cowl Lip Exit Angle, deg
12.275

Effective Cowl Gap Height, cm
2.58041

Effective Cowl Exit Throat Area, cm²
1267.127

Cowl Exit Prandtl Meyer Function, angle deg.
0

Cowl Exit Mach Angle, deg.
90

Cowl Lower Exit radius from CL, cm
77.8798

Effective Aerodynamic Expansion ratio, A/A*
15.2503

Aerodynamic A*, cm²
1267.13

Integrated Spike Cross section area, cm²
19054.6

Total Spike Cross section area, cm²
19054.6

Rg, J/kg-K
390.71

Operating Altitude, km
64.9478

Design (Optimal) Spike Exit Properties

Spike Exit Mach number
3.65231

Spike Exit Prandtl Meyer Function, angle deg.
77.725

Spike Exit Mach Angle, deg.
15.8905

Isentropic Spike Length, cm
276.625

Design Exit Pressure, kPa
34.743

Design Exit Velocity
2978.33

mdot, ve (kNt)
1094.39

Spike Exit Properties at Ambient Conditions

Spike Exit Radius Coordinate, cm
325.233

Ambient Spike Exit Flow Area, cm²
332307

Ambient expansion ratio
9765.55

Ambient exit Mach number
9.44891

Ambient Exit Prandtl Meyer Function
141.935

Expansion flow angle, deg
-64.2098

Design Altitude, km
8.16813

Design Thrust/Force Data

Design Pressure Thrust (Spike), kNt
922.223

Massflow, kg/sec
367.45

Throat Exit (kPa) Momentum Thrust
809.746

Design Isp, sec
303.701

Cowl Thrust Axial Direction kNt
172.156

Design Base Area Thrust, kNt
0

Design Total Thrust, kNt
1094.38

Expanded (non Ideal) Operating Exit Flow Properties

Flow Area, cm ²	Temperature, K	Thrust, kNt
332307	316.674	1161.5
Mach number	Pressure, kPa	Isp, Sec
9.44891	0.01	132210
massflow, kg/sec	Velocity, m/sec	mdot, ve (kNt)
0.895846	3674.12	3.29144
Cowl Thrust, kNt	Off-Design Pressure Thrust (Spike), kNt	
173.092	988.41	

Truncated Thrust terms

Base Pressure, kPa
19.9261

Base Drag, kNt
9.28923

RampThrust, kNt
957.193

TotalThrust, kNt
1138.64

Isp, sec
315.984

Data at Truncation

R value at truncation, cm
38.5312

Theta at truncation, deg
14.2576

Mach Number at Truncation
3.06432

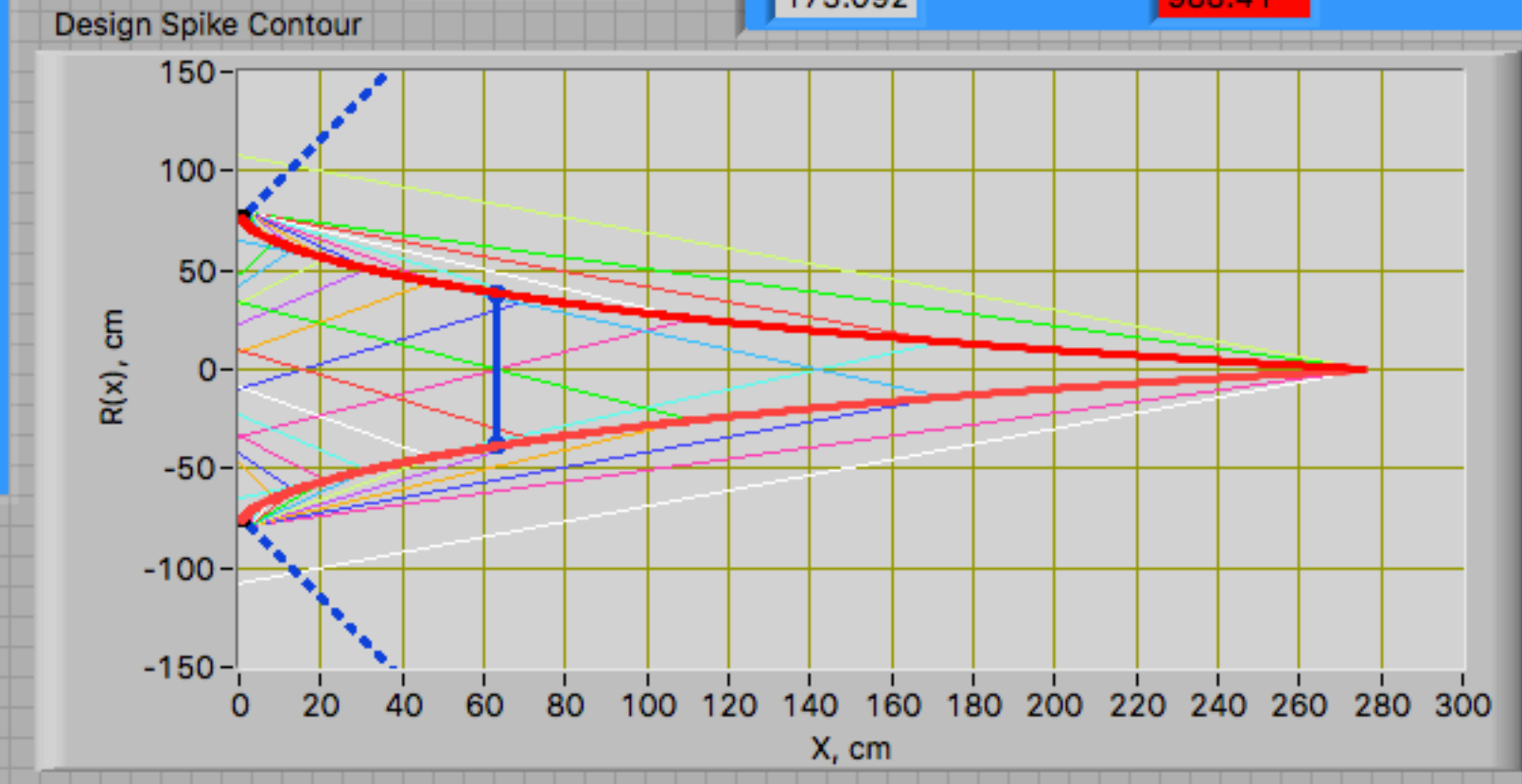
Spike Surface Pressure at Truncation, kPa
101.325

Spike Surface Temperature at Truncation, deg. K
1691.72

Spike Surface Velocity at Truncation, deg. K
2754

Spike Truncated base area cm²
4664.17

Spike Truncated Length cm
63.16



Select Method

- 5- Rocketdyne
- 4- Fick
- 3- Cylindrical
- 2- Conical
- 1- Mean
- 0- Prandtl-Meyer

write spike coordinate file output?
no

Write file path
/C:/ Documents and Settings/ MechEng/

