Spike
Injector Geometry

Injector port diameter 11.5951
Number of Ports 12
Radius of Cowl Upper Lip from CL, cm 78.4285
Port CL, Exit Angle, deg 12.275

Spike
Injector Geometry 2

Injector port Area, cm^2 105.594
Total Throat Flow Area 1267.13
Port Spacing on Spike, deg. 30
Gap between Ports, cm 29.47
collected port diameters 139.141

Cowl Exit Velocity, m/sec 1218.52
Cowl Thrust design 172.156
Cowl Thrust Off-design 172.156

Cowl Exit Properties

Cowl Lip Exit Angle, deg 12.275
Effective Cowl Gap Height, cm 2.58041
Effective Cowl Exit Throat Area, cm^2 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*, cm^2 1267.13
Integrated Spike Cross section area , cm^2 19054.6
Total Spike Cross section area, cm^2 2 19054.6
Rg, J/kg-K 390.71

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 276.629
Design Exit Pressure, kPa 34.743
Design Exit Velocity 2978.33
mdot, ve (kNt) 1094.39

Spike Exit Properties at Ambinet Conditions

Spike Exiit Radius Coordinate, cm 78.4284
Ambient Spike Exit Flow Area, cm^2 19324
Ambient expansion ratio 15.2503
Amibient exit Mach number 3.65231
Ambient Exit Prandtl Meyer Functior 77.7249
Expansion flow angle, deg 1.11974E
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

Truncated Thrust terms

Base Pressure, kPa 19.9261
Base Drag, kNt -6.91084
RampThrust, kNt 906.203
TotalThrust, kNt 1071.45
Isp, sec 297.338

Expanded (non Ideal) Operating Exit Flow Properties

Flow Area, cm^2 19324
Temperature, K 1392.77
Thrust, kNt 1094.38
Mach number 3.65231
Pressure, kPa 34.743
Isp, Sec 124570
massflow, kg/sec 0.895846
Velocity, m/sec 2978.33
mdot, ve (kNt) 2.66812
Cowl Thrust, kNt 172.156
Off-Design Pressure Thrust (Spike), kNt 922.228

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 cm^2 4664.17
Spike Truncated Length cm 63.16

Gas Properties

Gamma 1.222
MWght, kg/kg-mol 21.28

# of points along spike 1500
% truncation 77.1683

Operating Conditions

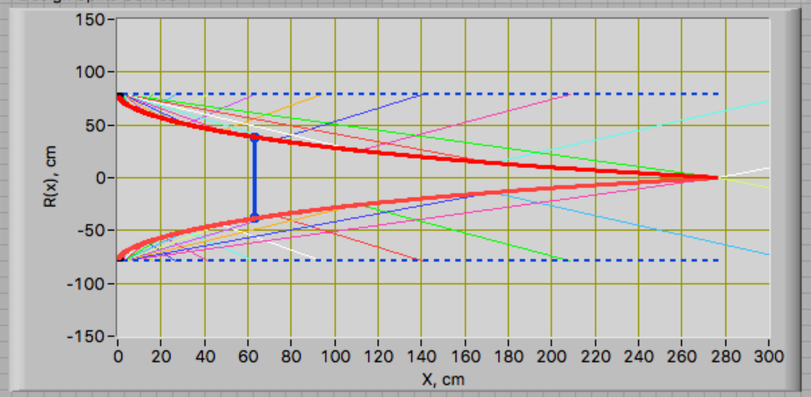
P0, kPa 5161.4
T0, K 3455
Pa, kPa 34.743

Operating Altitude, km 8.16812

# of points along spike 1500
% truncation 2 77.168

Draw Spike Mach Lines? to Cowl Lip no yes
Draw Spike Mach Lines? to Expansion Line? no yes
thin factor for mach lines 100

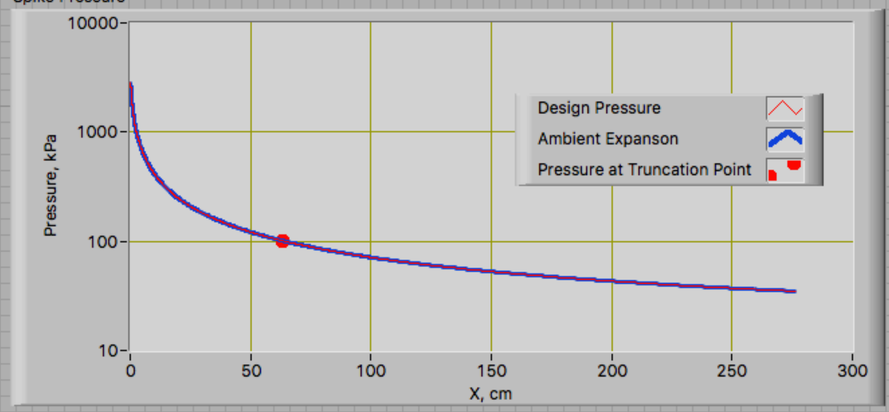
Design Spike Contour



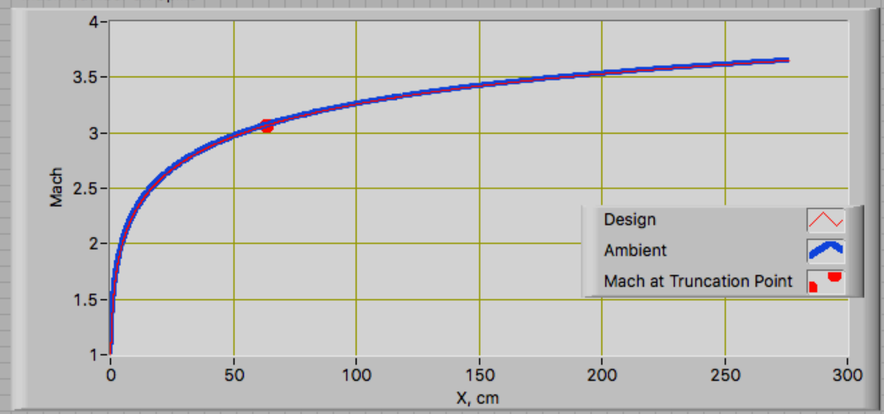
Select Method
Rocketdyne
Fick
Cylindrical
Conical
Mean
Prandtl-Meyer

write spike coordinate file output? no yes
Write file path
/C/ Documents and Settings/ MechEng/

Spike Pressure



Mach Number on Spike



Accumulated Thrust on Spike 2