



Approximate Methods of Hypersonic Inviscid Flowfields Formulas

Calculators!

Examples!

Conversions!

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List of 11 Approximate Methods of Hypersonic Inviscid Flowfields Formulas

1) Non-Dimensional Density

fx
$$ho_{\text{-}} = rac{
ho}{
ho_{ ext{liq}}}$$

Open Calculator

$$ext{ex} \ 4.300259 = rac{663.1 ext{kg/m}^3}{154.2 ext{kg/m}^3}$$

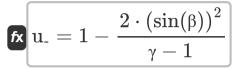
2) Non-Dimensional Density for High Mach Number

$$ho_{\scriptscriptstyle{-}}=rac{\gamma+1}{\gamma-1}$$

Open Calculator 🖒



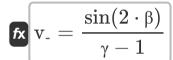
3) Non-Dimensional Parallel Velocity Component for High Mach Number



Open Calculator 🚰

ex $0.7347 = 1 - \frac{2 \cdot (\sin(0.286 \text{rad}))^2}{1.6 - 1}$

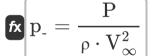
4) Non-Dimensional Perpendicular Velocity Component for High Mach



Open Calculator

 $\mathbf{ex} \ 0.902191 = rac{\sin(2 \cdot 0.286 ext{rad})}{1.6 - 1}$

5) Non-Dimensional Pressure



Open Calculator

 $0.800045 = rac{800 ext{Pa}}{663.1 ext{kg/m}^3 \cdot \left(1.228 ext{m/s}
ight)^2}$



6) Non-Dimensional Pressure for High Mach Number

 $\mathbf{f}_{\mathbf{x}} \mathbf{p}_{\mathrm{mech}} = 2 \cdot rac{\left(\sin(eta)
ight)^2}{\gamma + 1}$

Open Calculator

 $0.061223 = 2 \cdot rac{\left(\sin(0.286 ext{rad})
ight)^2}{1.6 + 1}$

7) Non-Dimensional Radius for Hypersonic Vehicles

 $\left|\mathbf{r}_{ au}
ight|\mathbf{r}_{ au}=rac{\mathrm{R}}{\lambda\cdot\mathrm{H}}$

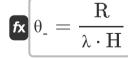
Open Calculator

8) Slenderness Ratio with Cone Radius for Hypersonic Vehicle

 $\lambda_{
m hyp} = rac{
m R}{
m H}$

Open Calculator

9) Transformed Conical Variable



Open Calculator

 $\boxed{1.904762 = \frac{8\text{m}}{0.5 \cdot 8.4\text{m}}}$

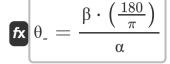






10) Transformed Conical Variable with Cone Angle in Hypersonic Flow 🗗

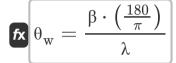




Open Calculator 2

$$= 1.900115 = \frac{0.286 \text{rad} \cdot \left(\frac{180}{\pi}\right)}{8.624 \text{rad}}$$

11) Transformed Conical Variable with Wave Angle 🗲



Open Calculator



Variables Used

- **H** Height of Cone (Meter)
- P Pressure (Pascal)
- p_ Non Dimensionalized Pressure
- pmech Non Dimensionalized Pressure For High Mech Number
- R Radius of Cone (Meter)
- r_ Non Dimensionalized Radius
- u Non Dimensionalized Upstream Parallel Velocity
- V_ Non Dimensionalized Velocity
- V_∞ Freestream Velocity (Meter per Second)
- α Semi Angle of Cone (Radian)
- β Wave Angle (Radian)
- Y Specific Heat Ratio
- θ₋ Transformed Conical Variable
- \(\theta_w \) Transformed Conical Variable With Wave Angle
- λ Slenderness Ratio
- λ_{hvp} Slenderness Ratio For Hypersonic Vehicles
- ρ Density (Kilogram per Cubic Meter)
- p Non Dimensionalized Density
- ρ_{liα} Liquid Density (Kilogram per Cubic Meter)





Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant
- Function: sin, sin(Angle)

 Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- Measurement: Length in Meter (m)
 Length Unit Conversion
- Measurement: Pressure in Pascal (Pa)
 Pressure Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
 Speed Unit Conversion
- Measurement: Angle in Radian (rad)
 Angle Unit Conversion
- Measurement: Density in Kilogram per Cubic Meter (kg/m³)
 Density Unit Conversion





Check other formula lists

- Approximate Methods of **Hypersonic Inviscid Flowfields** Formulas
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- Hypersonic Flow and Disturbances Formulas
- Hypersonic Inviscid Flow Formulas [7]
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