Bell Nozzle Rocket Engine Calculations

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Nomenclature

P	Pressure
T	Temperature
γ	Ratio of specific heats
$mol\%$	Mole percentage
ϵ	Nozzle area ratio
$\dot{m}$	Mass flow rate
R	Gas constant
v	Velocity
Ma	Mach number
M	Molar mass
ρ	Density
C_f	Vacuum thrust coefficient

Subscripts

$_c$	Chamber
$_t$	Throat
$_e$	Exit
$_a$	Ambient
$_s$	Stagnation

Introduction

Documentation of calculations for a bell nozzle rocket engine

1 Propellant

1.1 Propellant Stoichiometry

2 Exhaust Gasses

2.1 Ratio of Specific Heats of a Multi-Compound Gas

2.2 Stagnation Pressure

2.3 Stagnation Temperature

3 Combustion Chamber Geometry

4 Throat Geometry

5 Nozzle Geometry