Theoretical fuel for a simple rocket

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Abstract

In this paper, I describe the theoretical fuel for a simple rocket.
The paper ends with "The End"

Introduction

After Ancient India, rockets were subsequently designed by
both the Mongols and the Chinese for both attack and defense.

A **simple rocket** is a one-stage rocket with dry mass $d > 0$, fuel $f > 0$, payload $p > 0$, exhaust velocity $u > 0$ and a target velocity $v > u$ with zero initial velocity.

In this paper, I describe the theoretical fuel for a simple rocket.

Delta velocity

The **delta velocity** of a simple rocket is $\Delta v = v - 0 = v$

The theoretical rocket equation

The theoretical rocket equation is

$$\Delta v = u \ln \left(\frac{d + f + p}{d + p} \right)$$

Theoretical fuel for a simple rocket

Solving the theoretical rocket equation for f gives us the theoretical fuel for a simple rocket

$$f = (d + p) \left(e^{\frac{\Delta v}{u}} - 1 \right)$$

The End