Airfoil force approach to the rocket propulsion

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Current approach

The thrust of a rocket can be modeled from a generalization of Newton's 2nd Law to include a variable mass[i]:

$$F_{net\ external} = \frac{d(mv)}{dt} = m\frac{dv}{dt} + v\frac{dm}{dt}$$

Which eventually give us expression for rocket thrust:

$$F = -vR = -v\frac{dM}{dt}$$

v -velocity of exhaust relative to rocket

R- rate of mass ejection

Similar expression here:

Rocket Thrust Summary

$$\text{Thrust :} \quad F = \dot{m}\, V_e + (p_e - p_0)\, A_e$$ [ii]

$V_e = v$ - velocity of exhaust relative to rocket

$\dot{m} = R$ - rate of mass ejection

Note that in this approach force (rocket thrust) is linearly dependent of:

1. Exhaust velocity.
2. Rate of the mass ejection (propellant loss rate.)

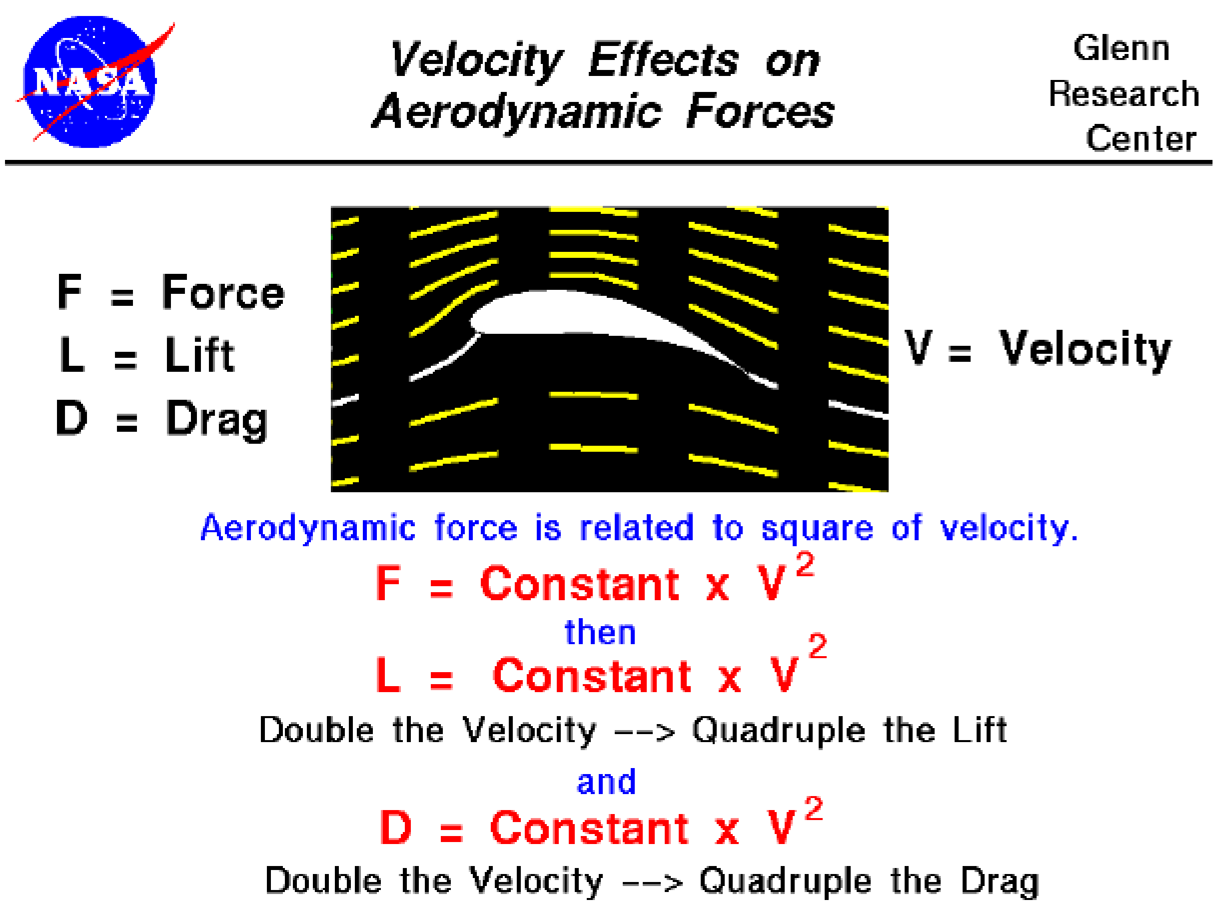
Airfoil force approach (my proposal)

If we force the exhaust gases to goes around airfoils we will have upward lift (airfoil is connected to the rocket).

Note that in this approach force (rocket thrust) has **quadratic dependence on the velocity**:

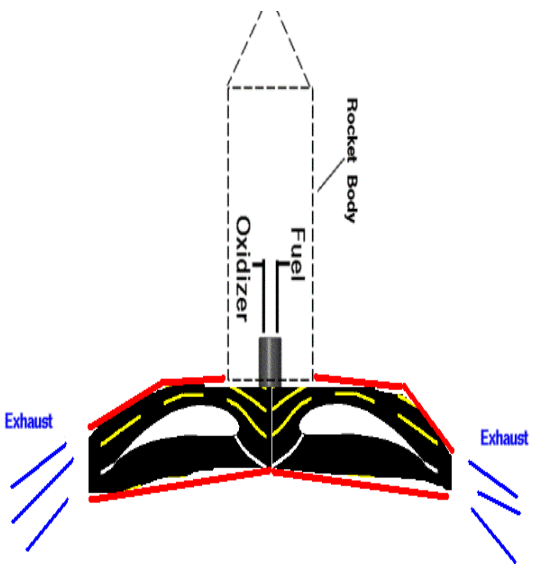
This quadratic dependence on the velocity is giving us opportunity to reduce rate of mass ejection (fuel loss).

To maximize the effect biggest possible exhaust velocity is needed.

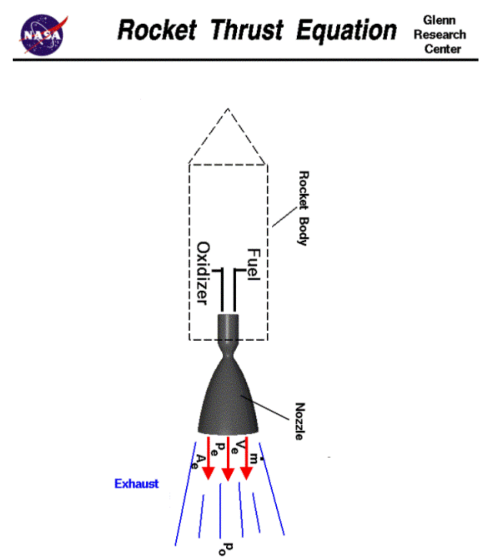


In other words

My proposal for initial testing



Current situation



The end

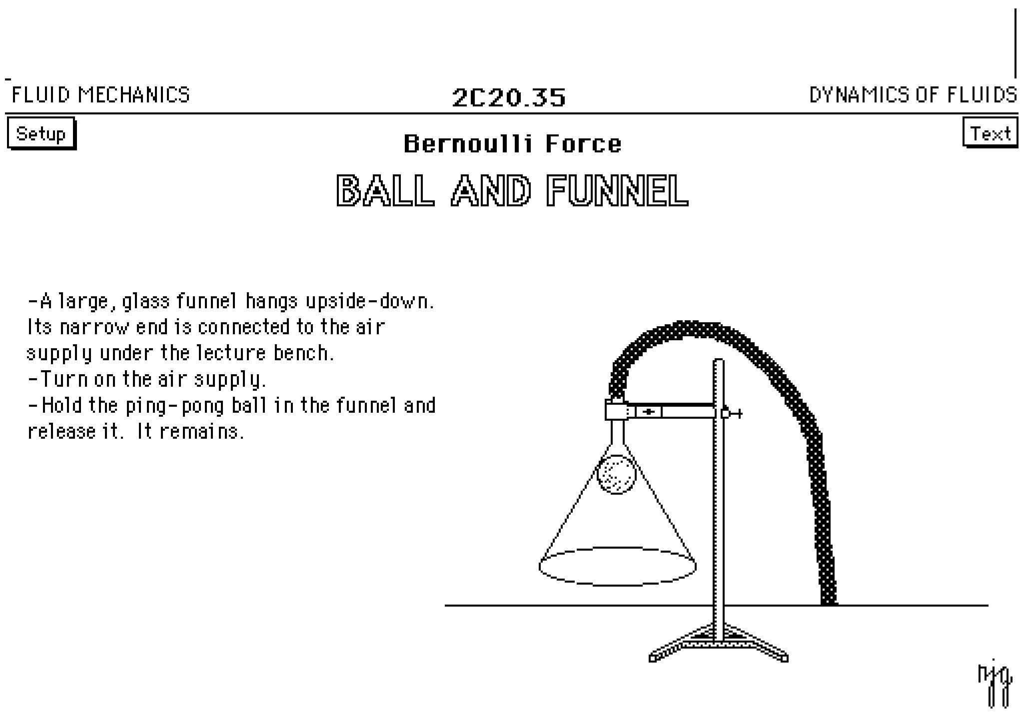
Interesting demonstration for the nonbelivers ☺

http://www.nhn.ou.edu/~see/fluid/2c20.35.gif

https://www.youtube.com/watch?v=lnSk7C6LsUU

https://www.youtube.com/watch?v=89-V410VhFw

http://www.nhn.ou.edu/~see/fluid/2c20.35.gif



[i] http://hyperphysics.phy-astr.gsu.edu/hbase/rocket.html

[ii] https://exploration.grc.nasa.gov/education/rocket/rktthsum.html

[iii] http://wright.nasa.gov/airplane/vel.html