

Rockets

The most incredible artificiality in the world!

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1 Momentum Theorem

In our world, we have an universal theorem, which named the Momentum Theorem.

According to this theorem, when someone push the other one, he will also receive a force from whom he pushed.

Futhermore, we have this formula to explain the momentum.

$$m_1v_1 = m_2v_2 \quad (1)$$

$$Ft = mv \quad (2)$$

When the rocket engine thrust. There will be a force pushing the rockets go up.

For example, if a rocket thrust 100kg fuel per second with a speed of 1000m/s, according to the formula mentioned above, we have:

$$F = \frac{mv}{t} \quad (3)$$

$$F = \frac{100kg \times 1000m/s}{1s} \quad (4)$$

$$F = 100000N \quad (5)$$

So we can send a rocket to space by using these principles.

2 Orbits

But, to pin a rocket to the space, we need to consider a little more.

It's the orbits.

Why can a rocket go around the earth, but not falling down? The answer is both simple and complex. It's the speed.

It's the time for formulas.

$$F = G \frac{m_1 m_2}{r^2} \quad (6)$$

$$F = m_2 \frac{v^2}{r} \quad (7)$$

G is Gravitational Constant, which is 6.67×10^{-11} . m_1 is the weight of our earth. m_2 is the weight of the satellite. And r is the radius of our earth.

So, after a little calculation, we have:

$$F = G \frac{m_1 m_2}{r^2} = m_2 \frac{v^2}{r} \quad (8)$$

$$G \frac{m_1}{r} = v^2 \quad (9)$$

$$v = \sqrt{G \frac{m_1}{r}} \quad (10)$$

$$v \approx 7907.13m/s \quad (11)$$

It means, if a satellite take off with a speed of 7907.13m/s, it can automatically go around the earth. 7907.13m/s is also the first cosmic velocity.

3 Escape Velocity

We have 3 cosmic velocities, which named 1st cosmic velocity, 2nd cosmic velocity, 3rd cosmic velocity.

A satellite can lift-off with the speed of the 1st cosmic velocity.

If a satellite wants to leave our earth, it has to have the 2nd cosmic velocity which is 11.2km/s.

If it wants to go out of our solar system, it is going to have the 3rd cosmic velocity which is $16.7km/s$.

4 Age Of Discovery

In my opinion, we are going to have the new Age of Discovery in decades.

Just like hundreds of years ago, we invented a ships which can travel all over the world. So we have discovered the world.

Whatmore in noadays, we have a lot of rockets, and we have invented a lot of technologies that will help us travelling around our solar system.

So, in my view point, we are going to have a new Age of Discovery.

5 References

<http://en.wikipedia.org/wiki/Momentum>

http://en.wikipedia.org/wiki/Saturn_V

http://en.wikipedia.org/wiki/Escape_velocity

<http://www.pep.com.cn/>

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