介紹

離子推進器[w]

離子推進器的原理是先將氣體電離，然後用電場力將帶電的離子加速後噴出，以其反作用力推動火箭[r]

這些推進器具有較高的比衝量，比衝量就是推力與推進劑消耗的比率[w]

學家們多用氙氣作為推進劑，因為它既重又有惰性，這代表著它不會與任何太空飛行器的材料發生反應[r]

而且原子相對較重，因此與其他候選推進劑相比，它們可以提供相對較大的推力[w]

那麼這種高比沖的霍爾離子推進器是如何工作的呢？[lr]

離子推進器通過增加或除去電子來產生離子，從而使更多的推進劑電離。[w]

大多數推進器通過電子轟擊使推進劑電離，這其實就是高能電子負電荷與推進劑原子中性電荷的碰撞過程[r]

，推進劑原子會釋放電子，產生帶正電荷的離子[lr]

離子推進器帶正電荷的離子以離子束的形式從推進器中加速，這樣就可以產生推力了。[w]

MPD[w]

The principle of MPD is to ionized the gas first, then accelerate the charged ions with an

electric field force, and then equip them to push the rocket with its reaction force.[r]

These thrusters have a high ratio of thrust, which is the ratio of thrust to propellant consumption.

Scientists use argon as a propellant because it is heavy and inert, which means it does not react with any space vehicle material.[r]

And atoms are relatively heavy, so they can provide relatively large thrust compared to other propellants. [w]

So how does this high-ratio MPD work?[lr]

MPD ionized more propellants by increasing or removing electrons to produce ions. [w]

Most thrusters ionize of propellants by electron bombardment, which is in fact the collision process between the negative charge of high-energy electrons and the neutral charge of propellant atoms.[r]

And the propellant atom releases electrons to produce positively charged ions.[lr]

The positively charged ions of the ion thruster accelerate from the thruster in the form of an ion beam, which creates thrust. [w]

另外霍爾離子推進器必須要有一個中和劑和一個空心陰極[lr]

排出等量的電子，使排氣束的總電荷呈中性。[r]

如果沒有中和劑，太空飛行器就會產生負電荷[r]

最終離子會被拉回內部，最終會降低推力並導致太空飛行器被腐蝕。[w]

而既然太空船本身不需要攜帶太多燃料，總重量大幅減少後就可以使用較小而經濟的運載火箭，節省下來的燃料更是可觀。[w]

離子推力器目前只能應用於真空的環境中。[r]

不過，在經過很長時間的持續推進後，將會獲得比化學推進快很多的速度[r]

這使得離子推力器被用在遠距離的航行中[w]

In addition, MPD must have a medium agent and a hollow cathode[lr]

to drain the same amount of electrons so that the total charge of the exhaust beam is neutral. [r]

If there is no neutralizer, the spacecraft will generate a negative charge.[r]

Eventually the ions are pulled back inside, reducing thrust and causing the spacecraft to corrode. [w]

Since the spacecraft itself does not need to carry too much fuel, the total weight is greatly reduced, and smaller and more economical launch vehicles can be used, saving even more fuel. [w]

MPD can only be used in vacuum environments at present. [r]

However, after a long period of continuous propulsion, it will be much faster than chemical propulsion.[r]

This allows that MPD can be used in a long-range voyage.[w]