

Special engine helps supersonic aircraft reach speed of 11,113 km/h

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With the same energy level, the shock wave triggers a series of explosions that occur almost instantly and release much more energy than a traditional internal combustion engine, especially at speeds above Mach 8 (9,878 km/h).

Earlier this year, the team conducted several tests with an indirect-detonation engine on the ground, generating thrust through a series of explosions that took place in the JF-12 hypersonic shockwave tunnel in Beijing.

The researchers' engine uses RP-3, a jet fuel commonly found at airports. Kerosene is a fuel with high energy density, easy to store and transport, making it a good choice for aspirated engines, according to Liu Yunfeng, head of the research team.

Igniting kerosene in extremely hot and fast-moving air is a challenge for scientists.

Kerosene burns more slowly than hydrogen, so engines running on this fuel need to have a longer combustion chamber bridge, about 10 times longer than those using hydrogen, to maintain the fuel-air mixture for a longer time. For most supersonic aircraft, adding more length is not feasible.

To overcome this problem, Chinese scientists added a tab to the engine's air intake surface. This simple adjustment makes it easier to ignite the kerosene while still keeping the combustion chamber compact.

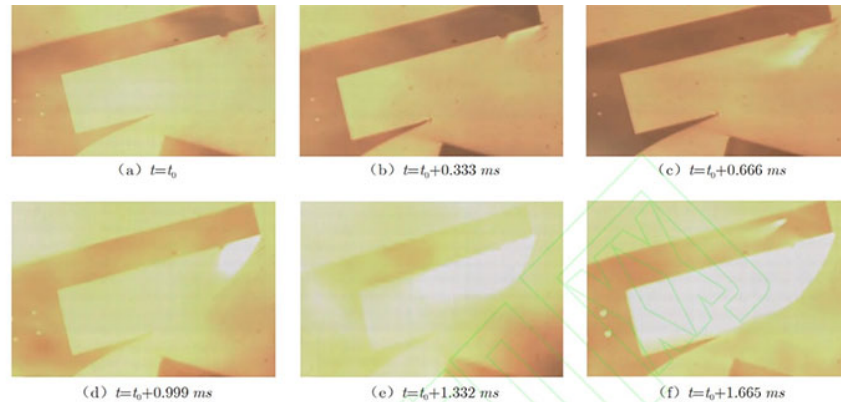


图9 航空煤油/空气斜爆轰波的非定常起爆过程 (Test 20220110)
Fig. 9 The transient initiation process of RP3/air oblique detonation (Test 20220110)

The results of the JF-12 tunnel test under various conditions showed that the generated shock wave not only ignited the kerosene but also confined the explosion to a small space, providing a stable supply of thrust.

The Chinese government hopes to build a fleet of hypersonic aircraft that can carry passengers anywhere on Earth within 1-2 hours.

To date, reducing manufacturing and operating costs remains a major challenge in the development of supersonic aircraft.

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