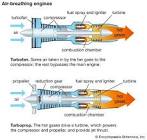
# Jet Propulsion

# Jet Propulsion: A Micro Project Report  


# Introduction

Jet propulsion is a method of propulsion that utilizes the principle of action and reaction. It is a fundamental concept in aerospace engineering and finds widespread applications in various fields. This report delves into the intricacies of jet propulsion, exploring its working principle, classification, applications, and its impact on modern technology.

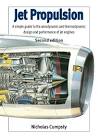
# Working Principle



Jet propulsion is based on Newton's Third Law of Motion, which states that for every action, there is an equal and opposite reaction. In the context of jet propulsion, the action is the expulsion of a high-velocity jet of fluid (usually gas) from a nozzle. This expulsion generates an equal and opposite reaction force, propelling the vehicle forward.

The principle can be explained using the momentum equation. The change in momentum of the expelled fluid is equal to the change in momentum of the vehicle. This momentum change translates into a thrust force that propels the vehicle.

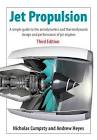
# Methodology



The implementation of jet propulsion involves a series of steps:

1. **Intake:** Air or other propellants are drawn into the engine.

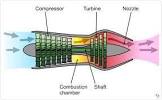
2. **Compression:** The incoming air is compressed to increase its density and temperature.

3. **Combustion:** In combustion engines, fuel is injected and ignited, releasing energy and expanding the gas volume.  


4. **Expansion:** The hot, high-pressure gas expands through a nozzle, accelerating to high velocity.

5. **Exhaust:** The high-velocity gas is expelled, creating thrust.

# Classification

Jet propulsion systems can be broadly classified into two main categories:  


## 1. Air-Breathing Engines

These engines rely on atmospheric air as their primary source of oxygen for combustion. They are further subdivided into:

### \*\*Turbojet Engines:\*\* These engines use a compressor to compress air, followed by combustion and expansion through a turbine and nozzle. They are efficient at high speeds.

### \*\*Turbofan Engines:\*\* Similar to turbojets, but with a large fan at the front that bypasses some of the air around the core engine, improving efficiency at lower speeds.

### \*\*Turboprop Engines:\*\* These engines use a turbine to drive a propeller, providing thrust. They are highly efficient at low speeds.

### \*\*Ramjet Engines:\*\* These engines rely on the forward motion of the vehicle to compress air, making them suitable for supersonic flight.

## 2. Rocket Engines

Rocket engines carry their own oxidizer, making them independent of atmospheric air. This allows them to operate in space.

# Applications

Jet propulsion finds widespread applications in various fields, including:

### \*\*Aerospace:\*\* Jet engines power airplanes, missiles, and spacecraft.

### \*\*Marine Propulsion:\*\* Jet engines can be used to propel boats and submarines.

### \*\*Industrial Applications:\*\* Jet propulsion systems can be used for thrust testing, wind tunnels, and other industrial processes.

# Results

The development of jet propulsion has revolutionized transportation and exploration. Jet engines have enabled faster, more efficient travel and have made space exploration a reality.

# Conclusion

Jet propulsion is a powerful and versatile technology that has significantly impacted modern society. Its principles are based on fundamental physics and have found widespread applications in various fields. Further advancements in jet propulsion technology are expected to continue driving innovation in transportation, exploration, and other areas.

# References

### Anderson, J. D. (2010). \*Fundamentals of Aerodynamics\* (5th ed.). McGraw-Hill.

### Hill, P. G., & Peterson, C. R. (2000). \*Mechanics and Thermodynamics of Propulsion\* (2nd ed.). Addison-Wesley.

### Mattingly, J. D. (2012). \*Elements of Propulsion: Gas Turbines and Rockets\* (3rd ed.). AIAA Education Series.