STUDY NOTES · BASIC CONCEPT

What is a Hypersonic Missile?

International Relations

26 Jan 2005

A hypersonic missile is a weapon system that travels at Mach 5 or higher (five times the speed of sound, ~6,100 km/h or more) and can maneuver during flight, making it extremely difficult to detect, track, or intercept.

Speed benchmark

- Mach 1 ≈ 1,225 km/h
- Hypersonic = Mach 5 to Mach 20+
- Range: 500 km to 5,000+ km (system dependent)
- Flight altitude: 20–70 km (much lower than ballistic missiles)
- Accuracy: Very high (with modern guidance systems)

BECOME IAS
AI-Powered UPSC Preparation by ZINKPOT

Why Hypersonic Missiles Are a Game-Changer

- Very high speed → reaction time reduces to minutes or seconds
- Unpredictable trajectory → defeats missile defence systems
- Low-altitude flight → avoids early radar detection
- Dual capability → can carry conventional or nuclear warheads

Main Types of Hypersonic Weapons

1. Hypersonic Glide Vehicles (HGVs)

- Launched using a ballistic missile
- Separate in upper atmosphere and glide at hypersonic speed
- Can change direction mid-flight
- Examples : Russia: Avangard, China: DF-ZF

2. Hypersonic Cruise Missiles (HCMs)

- Powered throughout flight by a scramjet engine
- Fly within the atmosphere at low altitude
- Require advanced materials to survive extreme heat (2,000–3,000°C)

- Examples : Russia: Zircon, India–Russia: BrahMos-II (under development)

How Hypersonic Missiles Work?

- Launch phase – missile or rocket booster accelerates weapon
- Hypersonic phase – travels at Mach 5+ with maneuverability
- Terminal phase – sharp evasive moves before striking target
- Unlike ballistic missiles, they do not follow a fixed parabolic path.

Countries With Hypersonic Capabilities

Russia

- Avangard (HGV)
- Zircon (HCM)
- Kinzhal (air-launched, quasi-hypersonic)

BECOME IAS
AI-Powered UPSC Preparation by ZINKPOT

China

- DF-ZF (HGV)
- DF-17 missile system

United States

- AGM-183 ARRW (air-launched, tested)
- CPS (Conventional Prompt Strike)

India

- DRDO working on HSTDV
- BrahMos-II planned (Mach 7–8)
- Focus on indigenous scramjet technology

North Korean leader Kim Jong Un personally oversaw the test flights of hypersonic missiles on January 4, 2026, state media reported, as Pyongyang continues to expand its weapons capabilities. The tests were described as part of a strategy to strengthen North Korea’s nuclear deterrent amid what Kim called a “recent geopolitical crisis” and complex international tensions. The hypersonic missiles reportedly hit targets about 1,000 km away over the sea east of North Korea, and were conducted just before South Korean President Lee Jae Myung’s visit to China.

Why it matters:

- Hypersonic missiles are high-speed, maneuverable weapons that are harder to intercept than traditional ballistic missiles, making them significant for military deterrence.
- North Korea’s state media framed the launches as necessary for maintaining and expanding its nuclear and military readiness.
- The tests took place after heightened regional tensions and were followed by condemnation from neighboring countries and concerns over regional security dynamics.

In short: Kim Jong Un’s oversight of hypersonic missile tests underscores Pyongyang’s focus on enhancing its military deterrence and weapons technology in response to what it calls a volatile geopolitical environment.

BECOME IAS
AI-Powered UPSC Preparation by ZINKPOT