

RSIS Commentary is a platform to provide timely and, where appropriate, policy-relevant commentary and analysis of topical and contemporary issues. The authors' views are their own and do not represent the official position of the S. Rajaratnam School of International Studies, NTU. These commentaries may be reproduced with prior permission from RSIS and due recognition to the author(s) and RSIS. Please email to Mr Yang Razali Kassim, Editor RSIS Commentary at RSISPublications@ntu.edu.sg.

Hypersonics: Next Big Thing or Next Big Fad?

By Richard A. Bitzinger

SYNOPSIS

Hypersonic weapons are seen by many as the “next big thing,” and, as such, great power militaries appear to be a hypersonics arms race. There are, however, many technical challenges to deploying an effective hypersonic weapon, and, even then, its impact on military balances may be less than projected.

COMMENTARY

MILITARIES ARE like teenagers in one crucial aspect: both are slaves to fads. If they can afford it, they've always got to have the “next big thing”. A hundred and so years ago, it was *Dreadnought*-class battleships. In the 1950s and 1960s, it was nuclear weapons. In the 1990s, it was the information technologies-driven “revolution in military affairs” – networking and jointness, and militaries outfitted with fantastic new weapons designed for long-range precision-strike.

With each new thing comes the next FOMO, or “fear of missing out”. No one who is truly hip wants to miss a trend. And military faddism has its own peculiarly ominous “bandwagoning effect”: to miss the “technology train” means to place one's country at risk to the growing military might of an adversary who does possess those capacities. And so we create a new action-reaction cycle, or, more colloquially, an arms race.

Hypersonics: Next Big Fad or Hyper Challenges?

As if by clockwork, we are currently searching for the next fad, the next big game-changer. For some, it is artificial intelligence (AI), the idea of autonomous, “learning machines” that could conceivably take charge of our thinking and our actions on the battlefield.

For others, it is hypersonics. Today, the hypersonic missile is the holy grail of the kinetic-kill weapons system. Travelling at a speed of anywhere from five to 15 times the speed of sound (that is, 6,000 to 18,000 kilometres an hour) and able to manoeuvre while doing so, the hypersonic cruise missile is believed unstoppable and impossible to defend against.

Keep in mind that hypersonics is not new. Countries have been working on them for decades, the United States in particular. The X-15, a manned rocket airplane that flew in the late 1950s and early 1960s, frequently exceeded Mach 5, the definition of hypersonic speed. At the same time, the US has worked on scramjet technologies since the 1960s and currently has several active hypersonic weapons programmes.

Up until recently, however, no one really worried themselves too much about hypersonics, especially hypersonic weapons. For one thing, the technology is daunting. Achieving hypersonic speeds is incredibly challenging, and most hypersonic projectiles rely on being given an initial boost on either a supersonic aircraft or a ballistic missile.

Moreover, the missile has to be made of materials that can withstand the punishing friction and heat of hypersonic speeds. As a recent *New York Times* article said about current US hypersonic prototypes, the skin of these projectiles “expands and deforms and kicks off a plasma like the ionised gas formed by superheated stars, as they smash the air and try to shed all that intense heat.”

Jumping on the Hypersonics Bandwagon

For a long time, therefore, technological challenges appeared to be an effective barrier to weaponising hypersonics. The Soviet Union (and later Russia) has been working on hypersonics as long as the US, with little to show for it (reports are that it could not perfect the necessary shielding to prevent the projectile from melting and breaking up). Most other countries were content with perfecting ballistic missiles and subsonic (but highly manoeuvrable and low-observable) cruise missiles.

Today, however, it seems that everyone is working on hypersonics. Russia has supposedly accelerated its programme to develop the *Avangard* hypersonic glide vehicle (HGV), which would be launched by an intercontinental ballistic missile (ICBM); according to reports, Moscow wants to deploy up to 60 *Avangards* by 2027.

India is also working on a hypersonic version of its BrahMos cruise missile (which currently flies at supersonic speeds), and the *New York Times* says that France, Australia, Japan, and the European Union all have military or civilian hypersonics research projects underway. In particular, Japan supposedly wants its own hypersonic weapon by 2025.

But it is China, as usual, that is driving most of the recent concerns over a hypersonics arms race. China has been working on an HGV designated the DF-ZF, and it has been test-launched several times, boosted by a conventional missile. The DF-ZF is reportedly capable of flying up to Mach 10 (12,000 kilometres an hour), possibly nuclear armed, and could be launched from an ICBM, giving it global coverage.

A Hypersonic Missile Gap?

All this, of course, has caused growing panic in the West, particularly the United States. Despite having worked for literally decades on the problem, there is now a new sense of urgency in Washington when it comes to closing a perceived hypersonic “missile gap” with China and Russia. In response, the US has been stepping up its game when it comes to hypersonics, such as developing a “conventional prompt strike” capacity using a hypersonic projectile.

But let’s pump the brakes for a minute. It is true that hypersonics is a “big thing,” although probably not the next big thing. The physics of hypersonics is a cruel mistress, and crafting a truly operational hypersonic weapon is still years off. Most current systems, even the Russian Avangard, are still basically proof-of-concept vehicles.

And their supposedly invincibility is not destined to last forever. ICBMs are hypersonic vehicles, and some were even outfitted with manoeuvrable warheads, but defences have been developed to cope with these threats. China’s DF-21D antiship ballistic missile was considered at one time to be a game-changing “carrier killer,” against which there was no defence; now it appears that such fears were exaggerated.

This is not to say that hypersonic vehicles do not matter, or that they will not be an extremely important metaphorical arrow in the quiver of future warfare. At the same time, faddism should not drive military acquisition. Just remember what happened to the laser disc, Google Glass, and New Coke.

Richard A. Bitzinger is a Visiting Senior Fellow with the Military Transformations Programme at the S. Rajaratnam School of International Studies (RSIS), Nanyang Technological University (NTU), Singapore.

Nanyang Technological University

Block S4, Level B3, 50 Nanyang Avenue, Singapore 639798
Tel: +65 6790 6982 | Fax: +65 6794 0617 | www.rsis.edu.sg