
Mathematics Anchors Malaysia's Cybersecurity and Digital Sovereignty

By Noor Eszereen Juferi

Photo by Muhammad Syuqqree Mohd Dain

SERDANG, 6 February – Mathematics is not merely an academic discipline centred on numbers; rather, it constitutes the fundamental pillar of cybersecurity, data protection and sovereignty of the world's digital infrastructure.

The Director of the Malaysia Cryptology Technology and Management Centre (PTPKM), Universiti Putra Malaysia (UPM), Datuk Prof. Dr. Muhammad Rezal Kamel Ariffin, stated that mathematics originated from observations of symmetry, patterns and harmony of nature — such as the golden ratio, the Fibonacci sequence and fractals — before evolving into complex structures that underpin advances in science, technology and the digital world.

“In essence, mathematics began with observations of symmetry, patterns and harmony of nature, such as the golden ratio, the Fibonacci sequence and fractals, before developing into complex structures that support progress in science, technology and the digital realm.



“The beauty of mathematics is not merely theoretical. These principles shape scientific thinking that emphasises clarity, simplicity and consistency, which ultimately form the basis of modern technological innovation,” he said during his inaugural lecture titled ‘*A Tribute to Mathematics: From Aesthetics to the Building Block of Cyber Security*’.

He added that within the context of cybersecurity, mathematical structures such as prime numbers, elliptic curves and finite fields play a critical role in developing secure and efficient cryptographic systems.

“Modern encryption techniques rely on the strength of specific mathematical problems. The key challenge lies in balancing implementation simplicity with high mathematical complexity to ensure that systems remain secure,” he said.

Datuk Prof. Dr. Muhammad Rezal stressed that Malaysia must move beyond being merely a consumer of technology to becoming a nation that develops its own cybersecurity systems based on its own mathematical frameworks.

“For years, we have adopted technologies developed by external parties. However, today’s cybersecurity landscape demands that we design our own mathematical foundations to protect national digital systems,” he said.



According to him, developments in quantum technology are expected to disrupt existing cybersecurity systems, placing the world in a new phase that enables nations to define their own digital security systems.

“When we define cybersecurity, we are in fact defining our mathematics. This is a historic opportunity for Malaysia to develop its own cryptology and digital security ecosystem as part of national development,” he said.

He also shared ongoing efforts to build a local technological ecosystem in collaboration with industry partners, including the development of locally designed smart devices currently in the beta testing phase.

“Mathematics is not merely a tool of calculation; it is a universal language that

enables humanity to understand nature, set goals and achieve well-being in life.

“Mathematics forms the foundation of the physical world, scientific thought and the metaphysical dimension of humanity. Its journey from aesthetic beauty to cybersecurity applications reflects humanity’s capacity to understand, master and safeguard modern digital civilisation,” he concluded.