

MATH

Genius sees beauty in complex equations

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Will Hunting," the popular movie about a much younger math prodigy. They frame mathematical conversations on time and space and rotating vectors. The words NEVER! Clean this board!!" keep well-meaning janitors at bay.

Something of a genius to those who know him, Kuipers loves Macintosh computers and interrupts his own stories to contemplate sunrise on Uranus. As he spins from one subject to another his hands itch to scrawl the math on a scrap of paper or patch of chalkboard. Or a stone bridge, maybe.

"Some of it is just beautiful," he says of the calculations and formulas undergirding daily existence. If Kuipers hears a symphony in the order of the universe, he also sees the sheet music that goes with it.

"Jack just has this ability to put mathematics to life," said Ernie Blood, a colleague of Kuipers in the early 1970s who now owns a technology firm in Vermont. "A lot of professors, they can prove this theory or that on paper, but then give them a practical problem..."

"He would sit down and write a mathematical solution to something practical and do it very elegantly."

A graduate of Grand Rapids Christian High School and Calvin College who has three degrees from the University of Michigan, Kuipers started building a reputation in the 1950s as a mathematician who could solve problems.

And mathematicians like Kuipers, working for defense and aerospace contractors to develop complex weapons systems for the U.S. Air Force, faced nothing but problems.

Each time a screaming jet turns, climbs or banks, its orientation to the earth changes. Put together a series of those changes and you have a rotation sequence. Lace together a series of rotation sequences while you're firing missiles or evading the enemy as you hurtle through the heavens and you have mathematical demands almost as fearsome as the weapons themselves.

Kuipers tamed those tigers. In the early 1970s he invented a device called an electromagnetic six-degree-of-freedom transducer. He holds the patent on the device that lets pilots merely look at a

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JACK KUIPERS
retired math
professor

target and push a button to direct bombs on target. (He used quaternions to improve it later.)

Kuipers — who moved back to Grand Rapids in 1966 so he and his wife, Lois Belle, could raise their five children near family — quietly did some of the work while he was at Calvin.

"I didn't dare breathe a word at Calvin at the time," he said, recalling the anti-Vietnam war sentiments of the day. Self-effacing and kindly, he's not thrilled at some of the military applications. He sounds like a man who's not sure how to process it, and talks of cheery civilian uses.

The work not only cemented his reputation as a world-class mathematician, it also made him one of the original pioneers in what's known today as virtual reality technology — computer-generated environments widely used in aerospace, defense and entertainment industries.

"He's spawned billions of dollars of sales," says Blood. "A lot of the early virtual reality equipment was based on the foundation that Jack Kuipers built."

He holds patents for a variety of products around the world, and has profited handsomely from royalties, though he's had to sue to get them as aerospace firms have merged over the years.

A man of science who ordered up a home phone number that ends with 3-1416 — the number pi — Kuipers knows God is out there, too. Even if he can't scribble down an equation on his chalkboard to prove it, "I'm given to know it," he said.

"It leaves you with the dilemma the Psalmist had: Oh God, where are you?" Kuipers said.

Now that his book is done, he'll have a little more time for pondering such matters.

"Every once in a while I get enough information," he said, "so I can ask the question in a different way."