



NOVA REVEALS MATHEMATICAL MYSTERIES OF HIDDEN PATTERNS FOUND IN NATURE, ART, SCIENCE & TECHNOLOGY

HUNTING THE HIDDEN DIMENSION
Tuesday, October 28 at 8pm ET/PT on PBS
www.pbs.org/nova/fractals



Produced for PBS
by the WGBH
Science Unit

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BOSTON, MA—You may not know it, but fractals, like the air you breathe, are all around you. Their irregular, repeating shapes are found in cloud formations and tree limbs, in stalks of broccoli and craggy mountain ranges, and even in the rhythm of the human heart. In a new film, *Hunting the Hidden Dimension*, NOVA takes viewers on a fascinating quest with a group of maverick mathematicians determined to decipher the rules that govern fractal geometry. The film premieres on NOVA Tuesday, October 28 at 8pm ET/PT on PBS (check local listings).

For centuries, fractals were considered beyond the boundaries of mathematical understanding. Now, mathematicians have finally begun mapping this uncharted territory. Their remarkable findings are deepening our understanding of nature, and stimulating a new wave of scientific, medical, and artistic innovation stretching from the ecology of the rainforest to fashion design.

Hunting the Hidden Dimension highlights filmmakers, fashion designers, physicians, and researchers using fractal geometry to innovate and inspire. Paula Apsell, director of the WGBH Science Unit and NOVA's senior executive, recognizes the impact fractals can have on our culture. "Fractals are being used in an amazing variety of ways and have the ability to change lives through medical advances, new technologies, and artistic achievement."

Produced and directed by Emmy and Peabody Award-winning filmmakers Michael Schwarz and Bill Jersey, *Hunting the Hidden Dimension* weaves cutting-edge research from the front lines of science into a compelling mathematical detective story. Told in an engaging, fast-moving, and visually imaginative style, the film introduces a number of distinguished individuals who have used fractal geometry to transform their fields, like Loren Carpenter, who created the first completely computer-generated sequence in a movie.

In the late 1970s, Carpenter stumbled across the work of a little-known mathematician, Benoit Mandelbrot, who coined the word "fractal," from the Latin word fractus, meaning irregular or broken up. Based on Mandelbrot's mathematical descriptions of fractals in nature, Carpenter was able to create detailed computer simulations of organic

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forms in a way that had never before been possible. The groundbreaking computer-generated sequence Carpenter produced in 1980 for *Star Trek II: The Wrath of Khan* marked a milestone in movie history, and owed its creation to fractal geometry.

It took a maverick with a hard-won aversion to authority to stand up to the conventional wisdom that nature stood outside the bounds of mathematics. Through interviews and personal artifacts, Mandelbrot shares the story of his struggle to survive as a Jewish teenager in Nazi-occupied France, his journey to America, and his lifelong fascination with a corps of European mathematicians whose explorations of the so-called “mathematical monsters” laid the groundwork for his own discoveries.

Filmmaker Bill Jersey believes Mandelbrot’s approach to fractals might ultimately become as significant as the cracking of the genetic code. “As fractals continue to revolutionize the way scientists develop theories and conduct research, the inevitable results will be innovations that dramatically change health care, environmental policy, design, and technology.”

In 1980, Mandelbrot published a mesmerizing image known as the Mandelbrot Set that had been generated by a single mathematical function. The intricate, mysterious beauty of this image won him acclaim from an unexpected quarter: the world of popular culture.

But fractals are more than pretty pictures. Almost all living things distribute nutrients through their bodies via branching networks, such as systems of blood vessels, which obey the rules of fractal geometry. In Toronto, physicist Peter Burns is making a mathematical model of blood vessels to try to find ways to diagnose cancer earlier than is now possible. In Boston, cardiologist Ary Goldberger has discovered that, contrary to centuries of belief, a healthy human heartbeat does not have an even pattern like a metronome, but rather has a jagged, variable fractal pattern—a discovery that one day may help doctors diagnose cardiac disease before damage is done.

“This film is about looking at the world around us in a completely different way,” says producer Michael Schwarz. “If you pay attention, you can see that fractals appear throughout nature. But until Benoit Mandelbrot came along, no one really understood what was there all along.”

Now in its 35th year of broadcasting, NOVA is television's most-watched on going primetime science series, reaching an average of five million viewers weekly. The series remains committed to producing in-depth science programming in the form of hour-long (and occasionally longer) documentaries, from the latest breakthroughs in technology to the deepest mysteries of the natural world. NOVA airs Tuesdays at 8pm ET/PT on WGBH and most PBS stations. The Director of the WGBH Science Unit and Senior Executive Producer of NOVA is Paula S. Apsell.

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NOVA is closed-captioned for deaf and hard-of-hearing viewers and described for people who are blind or visually impaired by the Media Access Group at WGBH. The descriptive narration is available on the SAP channel or stereo TV and VCRs. To order NOVA direct from WGBH Boston Video, visit shop.wgbh.org or call 800.949.8670.

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Production Credits

Hunting the Hidden Dimension

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Produced and Directed by Michael Schwarz and Bill Jersey

Co-Produced by Ed Gray

Edited by John Haptas

A Quest Productions and Kikim Media production for NOVA in association with Catticus Corporation

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