

Description

There is no Nobel Prize for Mathematics. The Abel Prize, therefore, fills that gap. Established in 2002, the prize is given by the Norwegian Academy of Science and Letters and is worth six million Norwegian kroner or about €750,000. It is named after Norwegian mathematician Niels Henrik Abel (1802-1828) whose achievements included generating the first proof of the general binomial theorem stated by Newton and Euler. This year's recipient of the prize is Dr. Yves Meyer, the French mathematician who played a critical role in developing the wavelet theory.

Joseph Fourier pioneered the field of Fourier analysis in the 1800s. Fourier discovered that a complex waveform can be represented as its simpler sine-wave components, allowing the original waveform to be expressed in a more compact format. However, it was difficult to apply Fourier's equations to real world data. They worked fine when assessing a steady signal but were inefficient if the data was noisy. In 1981, French geophysicist Jean Morlet developed an algorithm that could replace sinusoidal waves even though they were of finite duration. Morlet called these waveforms wavelets. However, more work was still needed before Fourier's equations could be applied to a wide range of practical applications. This is where Meyer comes in.

In 1982, Dr. Meyer came across Morlet's wavelet paper and decided to switch fields. By 1986, he had created the first set of wavelets that were as powerful as Fourier's waves. During his time at the University of Paris-Dauphine, Dr. Meyer would continue to work on the theory while being at the center of an active group of mathematicians, engineers, physicists, and computer scientists. Part of his success was in being able to communicate with these diverse individuals and merge their insights into a unified theory.

When wavelets are combined with an unknown signal via a set of math equations, information can be deduced about the original signal. They are useful when you want to filter out information you are not interested in while retaining the important signal. They can also be used to detect edges because wavelets easily identify areas where a signal is changing rapidly. Wavelet theory has found practical applications in next generation data compression, noise reduction, medical imaging, Hubble telescope imaging, advanced archiving, and detection of gravitational waves during a double black hole collision.

Dr. Meyer was born in Tunisia and obtained his PhD from the University of Strasbourg in 1966. He served as a math professor at the Université Paris-Sud between 1966 and 1980, then at the École Polytechnique between 1980 and 1986, and at the Université Paris-Dauphine between 1986 and 1995.

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His last appointment was at the École normale supérieure Cachran in 1995 where he worked until his retirement in 2008. He became a foreign associate of the US National Academy of Sciences in 2014. He was awarded the Salem prize in 1970 and the Gauss prize in 2010 for advances in math that have an impact outside the field. He has also been an invited speaker at the International Congress of Mathematicians three times.

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