

### Excerpt: Story of Fourier

Joseph Fourier's father was a tailor in Auxerre. After the death of his first wife, with whom he had three children, he remarried and Joseph was the ninth of the twelve children of this second marriage. Joseph's mother died when he was nine years old and his father died the following year.

It was during his time in Grenoble that Fourier did his important mathematical work on the theory of heat. His work on the topic began around 1804 and by 1807 he had completed his important memoir *On the Propagation of Heat in Solid Bodies*. The memoir was read to the Paris Institute on 21 December 1807 and a committee consisting of Lagrange, Laplace, and others was set up to report on the work. Now this memoir is very highly regarded but at the time it caused controversy.

There were two reasons for the committee to feel unhappy with the work. The first objection, made by Lagrange and Laplace in 1808, was to Fourier's expansions of functions as trigonometrical series, what we now call Fourier series. Further clarification by Fourier still failed to convince them.

The second objection was made by Biot against Fourier's derivation of the equations of transfer of heat. Fourier had not made reference to Biot's 1804 paper on this topic but Biot's paper is certainly incorrect. Laplace, and later Poisson, had similar objections.

The Institute set as a prize competition subject the propagation of heat in solid bodies for the 1811 mathematics prize. Fourier submitted his 1807 memoir together with additional work on the cooling of infinite solids and terrestrial and radiant heat. Only one other entry was received and the committee set up to decide on the award of the prize, Lagrange, Laplace, Malus, Häüy, and Legendre awarded Fourier the prize. The report was not however completely favourable and states:

*... the manner in which the author arrives at these equations is not exempt of difficulties and that his analysis to integrate them still leaves something to be desired on the score of generality and even rigour.*

With this rather mixed report there was no move in Paris to publish Fourier's work. His work was later published in 1822.