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The Re-Discovery of the Fast Fourier Transform Algorithm*

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Abstract. The discovery of the fast Fourier transform (FFT) algorithm and the subsequent development of algorithmic and numerical methods based on it have had an enormous impact on the ability of computers to process digital representations of signals, or functions. At first, the FFT was regarded as entirely new. However, attention and wide publicity led to an unfolding of its pre-electronic computer history going back to Gauss. The present paper describes the author's own involvement and experience with the FFT algorithm.

Key words: FFT, fast Fourier transform, DFT, discrete Fourier transform.

In 1952, a professor specializing in numerical analysis was asked why, with the advent of large high speed electronic computers, one should work on developing faster algorithms. The speed and size of these new machines should permit known algorithms to yield solutions with more than sufficient speed and economy. Recent studies of the history of the fast Fourier transform (FFT) algorithm, going back to Gauss [1], provide an example of exactly the opposite situation. After having been published and used over a period of 150 years without being regarded as having any particular importance, the FFT was re-discovered, developed extensively, and applied on electronic computers in 1965, creating a revolutionary change in the scale and types of problems amenable to digital processes. Thus, as in several other areas of numerical analysis, the advent of the electronic computer has stimulated the development of new algorithms which increase computing power by many orders of magnitude.

The 1965 publication of the paper [2] which has been credited with the "discovery" of the FFT algorithm produced three almost immediate responses:

(1) The algorithm was new and revolutionary and it opened up a new world of digital processing, increasing the power of Fourier methods by many orders of magnitude. No problem would be too large.

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