Discrete-Time Fourier Series is a linear combination of complex exponentials with fundamental frequencies that are integer multiples of the fundamental frequency of the pe- riodic sequence. The motivation for representing discrete-time signals through the Fourier series is identical in both continuous and dis- crete time. Complex exponentials are eigenfunctions of linear time-invariant systems and therefore the effect of an LTI system on each of these basic signals is simply a (complex) amplitude change. However, in the discrete time case, the representation in- volves only The discrete-time Fourier transform is a summation very similar in form to the syn- thesis equation and suggests a strong duality between the analysis and syn-thesis equations. Because the basic - Signals and Systems - complex exponentials repeat periodically in frequency, two alternative inter- pretations arise for the behavior of the Fourier series coefficients. One inter pretation is that there are only N coefficients and the second is that the sequence representing its Fourier Series coefficients can run on indefinitely but re- peats periodically. In order to retain a duality The discrete-time Fourier series coefficients for a discrete time periodic square are obtained by using the analy- sis equation. This is because the synthesis equation is now an integral and the analysis equation is a summa- tion. This represents one difference between the discrete and the continuous Fourier transforms. Another important difference is that the fourier series is always a periodic function of frequency. Consequently, it is completely defined by its behavior over a fre- quency range of 27r in contrast to the continuous fourier transform which extends over an infinite frequency range Discrete-Time Fourier Series - TRANSPARENCY . Illustration of the discrete-time Fourier series coefficients as samples of an enve-lope. Transparencies . demonstrate that as the period increasesthe envelope remains the same and the samples representing the Fourierseries coefficients become more closely spaced. HereN = . TRANSPAENTRY . N is a review of the approach to developing a Fourier representation for aperiodic signals. Nao Envelope: sin[(2N1 + ) /] sin (W/ The Fourier series coefficients for discrete-time aperiodic signals are used to represent them as the limiting form of a periodic signal with the period increasing. These coefficients function as the period increases and are compared to the Fourier Series coefficients of the discrete time apériodic signal. A summary of the approach to be used to obtain a Fourier representation of discrete times aperodic Signals and Systems - TRANSPARENCY The discrete-time Fourier transform for a rectangular pulse is described in terms of the discrete time Fourier series as the period approaches infinity. The upper limit in the summa-tion in the second equation should be n = (N/) - . The analytical and synthesis equations for the fourier transform are presented in detail. The first equation is a fourier transformation for an exponential sequence. The second equation is an analysis of the three-dimensional fourier series. The Fourier series coefficients of a periodic signal are described in terms of the Fourier transform of one period. The fourier transform is defined as a discrete-time Fourier Series that is equal to times samples of Fourier transformations of one periodic signal. This means that the fourier transformation can be used to determine the number of periods of the signal. In this lecture, we discuss the relationship between the Fourière transform and the Fouriers transform for a given signal. MIT OpenCourseWare is a free online learning resource for Signals and Systems. It provides an overview of the fourier series coefficients of fourier transforms of x in and xin. This information can be used as a learning resource in a variety of ways. The following are some of the most commonly used Fourier transform coefficients: n periodic x[n] REPRESENTS ONE PERIOD - Fourier series covariances of [n] = (/ N ) times samples of Fourier transformation of X