# Comparison of the Contribution of Quantization Error in Level and in Time into the Result of Analog-to-Digital Conversion

VADIM ZHMUD

*Abstract*: Choice of analog-digital converters (ADC) for converting of signals is based on a compromise between speed and accuracy, even if the price of ADC can be not taken into consideration. Obviously, the accuracy of ADC is connected with the number of digits, though not only this limits it. Nyquist theorem (Nyquist-Shannon sampling theorem) states that at sufficiently high accuracy of samples taking it is enough to take them with a frequency of more than twice of the maximum frequency of the spectrum of the converted signal. This requirement sets the limits of applicability of digital conversion, and if, under the terms of the pure theory, the signal is infinite in time and the samples are taken from the zero error and the upper limit of the frequency band of signal is known. Under these conditions, such readings gives the opportunity to restore the original signal without loss. On this basis, many practitioners, engineers, teachers, and researchers believe that the accuracy of the conversion has the highest priority, and the frequency of conversion can be not too high, it is enough to provide the required conditions of the theorem. However, in practice, the signals are limited in time, the accuracy of the conversion is also limited, and the restoration of the original signal not uses the best algorithms for calculating it. The proof of this theorem does not take into account such situation. The question of the criteria for selecting the ADC is relevant, espessially if it is noe possible at the same time to provide a higher precision and higher performance. It is important to know, which of these parameters should be considered as the most important one, and what parameter you can donate. This paper explores this question by modeling.

*Key words*: data collection and data processing, ADC, sampling, quantization of the time, quantization of the level

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**Vadim Zhmud**

E-mail: oao_nips@bk.ru