COMPARATIVE ANALYSIS OF DISCRETE AVERAGING SUBTRACTS OF THE MEASURING CHANNEL

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Digital Signal Processing is one of the most powerful technologies that will shape science and engineering in the twenty-first century. Revolutionary changes have already been made in a broad range of fields. Digital Signal Processing is distinguished from other areas in computer science by the unique type of data it uses: signals. In most cases, these signals originate as sensory data from the real world: seismic vibrations, visual images, sound waves, etc. [1, 2]

In paper correcting properties of discrete averaging operator are investigated at digital measurements of non-sinusoidal signals integrated parameters. By usage of statistical modeling it is proved, that this operator has correcting properties in relation to suppression of systematic and casual errors of voltage and current signals [3-5].

The paper has deal with investigation (using computer modeling) of the moving average discrete integrating correcting filtering effects relevant to systematic and random noise's deduction while digital metering of active power in circuits with non-sinusoidal signals.

Effectiveness indicators of digital processing algorithms for measurement samples of non-sinusoidal signals was analyzed with the help of calculating experiments.

When integral functions are non-linear the investigation of corrective properties of discrete averaging is analyzed around decreasing error.

For instance, the error while measuring average power is shown in below model:

$$\delta_M(kT_0) = x(kT_0)\cdot\bar{\varepsilon}(kT_0) + x(kT_0)\cdot\varepsilon^o(kT_0),\ \ k = \overline{0, M-1}.$$

In the calculation experience statistic modeling is used. $x(t) = \sum_{n=1}^{2N+1}\sin(n\omega_1 t), \quad N = \overline{1,6}$ is produced as non-linear $x(t)$ signal. (here ω_1 is the frequency of main harmony)

As an $\varepsilon^0(t)$ error random signal produced by "Matlab rand" function was taken in the interval [0,1].

Specter of signals evaluated with Fourier transforms (fft function) in Matlab environment.

To evaluate decreasing level of additional harmonies, we have analyzed discrete averaging the $\delta_M^0(t)$ signals by equal intervals

Researches show that, in this case 40dB decreasing spectres of errors is achieved and this prooves corrective properties of discrete averaging operator.

In this paper, for different instrumental errors correcting, filtering properties of moving discrete averaging was investigated using computer modeling.

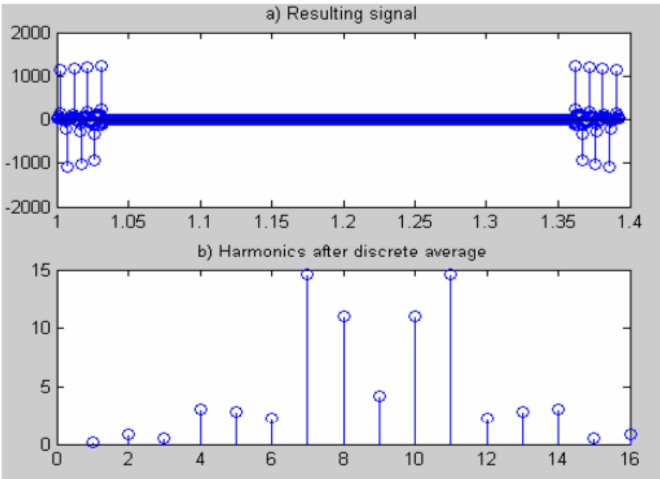
Correcting properties of moving discrete averaging operator regarding instrumental errors was investigated to decrease $\delta_M(kT_0)$ error.

The specters of $\delta_M^0(t) = x(t)\cdot\varepsilon^0(t)$ signal was analyzed and observed that it includes harmonics (to the 13^{th} degree) having amplitudes up to 60 dB. After filtering noise was decreased down to 50 dB (picture 2).

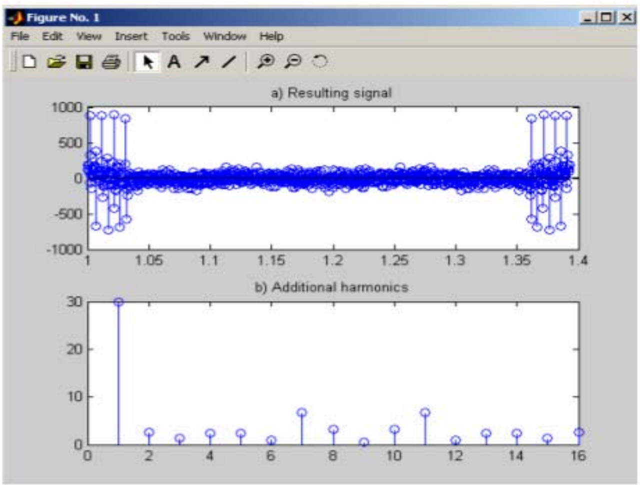
While comparing results from discrete averaging, it was found that moving discrete averaging is more effective than discrete averaging to increase accuracy in digital measuring of non-sinusoidal signals.

This is explained with addition of retroscopic statistic smoothing effects to current smoothing while implementing moving discrete averaging operator.

So, implementation of moving discrete averaging algorithm is important to improve metrological characteristics of digital measurement methods.



Picture 1.



Picture 2.

Literature

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