

## **Method for calculating the instantaneous frequency of a discrete vector function.**

*Sedoykin D. N.*

This paper deals with the calculation of the instantaneous frequency of a signal whose digital model is represented by a discrete vector function. The object of the study are methods of calculation of instantaneous angular velocity/frequency vector function. The subject of the study are errors in calculating the instantaneous angular velocity/frequency, the causes of occurrence and ways to eliminate them.

The paper considers the basic ways of calculating the instantaneous frequency of a signal represented by a vector function, based on quadrature components (orthogonal projections). The accuracy of each calculation method is evaluated by comparing errors. Practical recommendations for the selection of the measuring range for the instantaneous frequency of the signal and the choice of the sampling frequency are given. It is proved that by changing the modulus of the discrete vector function, the calculation of its angular frequency/velocity will be carried out with an error, and thus, the inexpediency of using the classical method of computing the instantaneous angular frequency in practice is substantiated. It is shown that in order to eliminate this error, the calculation of the instantaneous frequency of the vector function must be performed only after its modulo normalization. A simulation model is presented that clearly demonstrates the methodological and instrumental errors for each of the frequency calculation methods considered in this paper.

*Key words: digital signal processing, structural analysis of signals, instantaneous angular frequency, angular velocity of the vector function, frequency calculation error, Hilbert transform, analytical signal.*