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About Principal Possibility of Automated Following by Active Frequency of Non-Stationery Processes Spectrum by Means of Active Filter

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Abstract—It is underlined explicit usefulness and efficiency of hardware analysis of active spectrum of non-stationery processes, necessity of automated following by frequency of input signal filters (AFFF) application as analyzing filters. It is mentioned drawbacks of analysis methods of such filters and necessity of approval possibility of frequency self-tuning of any type filters (FSAF) of high order. Possibility of FSAF and, hence, AFFF is proven in terms of application of some known features of manual regulation of electrical filters. By means of computer mathematical modeling in system VisSim /com it is proven AFFF possibility. It is underlined possibilities of some useful their application.

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ABOUT A POSSIBILITY OF AFFF. PROBLEM STATEMENT

Usefulness of application of hardware spectral analysis of physical processes in different science and technology field of applications is known [1, 2]. It is also known [2, 3] that these processes are non-stationery. This feature is needed to be taken into account [4] in development of new spectrum analyzers and application of known ones. Main drawback of these analyzers is fact that analyzing filters are stationery and they are not adequate to analyzed non-stationery processes. It leads to intolerable errors of measurements or undesirable analysis time increase up to comparative great limit [5] of structural uniformity.

A possibility of non-stationery processes hardware spectral analysis efficiency increase is application of known [6] conception of time function active spectrum. This spectrum at every time point carries practically all information about initial process, continuously moving along "passive" frequency band of essential width. In general case non-stationery process can be represented [6] in form of components, which have their own active spectrum. Hence, it is necessary to use parallel analyzer [1] as a non-stationery process spectrum analyzer in general case. Narrow-band filters of this analyzer must follow active spectrum moving in each channel and they must be filters of high order [1, 2].

It is known [7], that non-stationary process can be clearly periodic during definite sufficiently long time cell. Therefore, natural active spectrum of each component must have [3] sufficiently small discrete structure. Periods, durations and shapes of these time cells are modifying in random manner from one to another time cell. Just these modifications must be followed by analyzer filters. Its operation efficiency can be increased due to application of more narrow-band filters or another analysis method [8].

Consequently, for efficient application of hardware analysis of non-stationery processes spectrum possibilities, it is necessary to know completely about operation features of filters in automated following by input signal frequency (AFFF) mode.

Certainly, this knowledge can be obtained by corresponding differential equation solution. This equation is generated for analyzed system and its solution contains all necessary information not only about steady state, but also about transient processes. It is known [9] comparatively great amount of integration methods of ordinary differential equations, which characterize functioning of different electronic systems, like oscillating circuit with automated controlled resonance frequency [10]. But all these methods, including method of reduced differential equations [9, 11] are approximate and they can be applied only for systems of the second order researching. Mathematical analysis of general electric filters of higher than second order is almost impossible.