THE MODERN METHODS OF RESEARCHES OF BIOELECTRICAL SIGNAL THIN STRUCTURE

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At the present time the authors develop the experimental model of Hardware-Software complete system for the research of thin structure of bioelectrical signals. The main problem of creating wide class application devices, including multi-channel on-line processing of bioelectrical heart activity is under way. The following step constitutes diagnostic systems based on revealed non-stationary pathological patterns

First of all the problem of new medical-biological diagnostic systems synthesis is closely connected with the using secondary processing of bioelectrical signals and improving technical characteristics of registering equipment.

The authors use the most achievement investigations in Digital Signal Processing microelectronic technologies: high precision low-noise amplifiers of bioelectrical signals, high-tension sigma-delta ADC, FPGAs with built-in DSP blocks and NIOS II Processor.

The problem of high-precision synchronization of registration devices and periodical bioelectrical signals secondary processing is of great actuality to us. On this stage we expose characteristic signs of periodic of researching signals, including definition several characteristic points Due to this points we can reveal the indications of periodic of researching processes. We are searching methods of reduction of influence fluctuation forms and another characteristics of useful signals and several kinds of casual noise. The main task of research is to reveal any non-stationary (either by time of appearance or by form) components of useful signal and to consider their statistical characteristics. The particularities of forming of bioelectrical activity signals make condition upon the methods of identifications of stochastic signals and statistics methods of revealing low-amplitude signals in colored noises

The algorithms approximating to on-line are of great interest to us. The perspective approach to create algorithms of revealing and classifications is to represent information signals by equivalent parametric regression models. The parameters of above-mentioned models determinate statistical properties of recognized and classified processes. In particular we use wavelet-transmission for investigation spectral qualities of bioelectrical signals.

The multi-channel processing methods development has wide scientific and clinical significance. It makes possible to realize spatial-timing dynamics, wave-excitement movement and pathological patterns location. Wide using spatial-timing filtration will give us the splendid opportunities to realize potential capabilities of revealing low-amplitude signals in many fields of various bioelectrical processes researches such as: ECG, EEG epilepsy forms (especially in neonatal neurology as finding non-standard seizes patterns, EMG (diagnostics of collagenosis).

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