













$$j_{i+1,1} = l_i N_i + \frac{(l_i - 1) N Q_{\min}}{Q_{\max} \prod_{i=1}^{l_i-1} l_i - Q_{\min}}, \quad (6)$$

where  $l_i = (n_{i,j} M_{i,j})^{1/4}$ . By the repeated indexes there is no sum. Because  $l_i$  is rational number, then due to  $\prod_{i=1}^{l_i-1} l_i = (r_0)_{\max} / (r_0)_{\min}$  is known,  $l_i$  is computed from the condition

$$l_i = \frac{j_{i+1,1} \left\{ (Q_{\max} / Q_{\min}) \left[ (r_0)_{\max} / (r_0)_{\min} \right] - 1 \right\} + N}{N_i \left\{ (Q_{\max} / Q_{\min}) \left[ (r_0)_{\max} / (r_0)_{\min} \right] - 1 \right\} + N}. \quad (7)$$

Thus, selecting in (7)  $N_i = idem$ ,  $j_{i+1,1} = idem$ , one can get  $N_i = Ni / I$ ,  $j_{i,1} = N(i-1) / I$ ,  $j_{i+1,1} = Ni / I$ ,  $l_i = 1 \Rightarrow (r_0)_{\max} = (r_0)_{\min} = r_0$ , that means trivial case. We use expressions (5)-(7) at a choice of a way of splitting an interval. At rather big variation intervals at the same time of several parameters of experimental installation, it is very difficult to make such splitting without the offered formulas.

### 3 Control of film flow decay using the generator of poly-harmonic currents

At the operated disintegration of the jet and film flows of the electro-conductive liquid the form of the formed drops (particles, granules) depends on the variation law of controlling influences [7-9]. The magnetic pressure acting on the jet and film flows is created by interaction of the current induced in the conductive liquid with an inductor's field (for induction systems) or by interaction of the current entered into the channel with the conductive liquid and an external magnetic field (in conduction type systems). Thus the law of change of magnetic pressure is defined by the law of current change in the inductor or the current proceeding in the conductive liquid.

At the electromechanical (vibration) way of control of disintegration of jet and film flows considered further the form and the sizes of the formed drops (particles) are defined by character of a current and, in particular, by the law of the movement of the disk influencing jets and films. The law of the disk movement is defined by a type of current in a winding of an electromagnet of the vibration device VEDS-10A creating the movement of a disk (this movement was strictly vertical).

The special sources of current allowing to receive current of the set form are necessary for the process control by disintegration of the jets and films descending from a disk, as well as in case of

electromagnetic action at electromechanical control. Such sources developed at the Institute of Electrodynamics of the National Academy of Sciences of Ukraine (IED NASU) [7,8] were tested on various installations providing the poly-harmonic external impacts on jets and films.

The Source of the Poly-harmonic Currents (SPC) consists of the control unit (CU) providing the set law of change of current, and the power block amplifier of the power (AP) providing the necessary level of current. CU can be executed with "rigid" logic of control, i.e. with unchangeable algorithm when one certain law of current's change is provided. But CU can also execute with reprogramming possibility when various demanded algorithms of a functioning allowing to reproduce the set laws of current's change are set.

The carrier of the program represents a replaceable operational memory (ROM) in which in the form of digital codes the algorithm is stored. Replaceable ROM as the carrier of the program is used if control algorithms are known in advance and they are comparably in small amount. The microprocessor is the logical block which is carrying out operations on processing of basic data about algorithm and development of all signals for control of SPC.

The shaper of input signals for the AP represents the digital-to-analog converter (DAC) if as a part of SPC as the AP the amplifier of continuous action is used. On input of the amplifier the signal representing approximation of a curve of the set law of change of output current of SPC is given. The type of an approximating curve is selected proceeding from the necessary accuracy of reproduction of the set law of change of current.

If as a part of SPC the key amplifier is used, the shaper has to on signals of the microprocessor create discrete signals with a certain level and temporal ratios which will be transformed to signals of an analog form by the amplifier. Among the key amplifiers in the region of formation of signals with the set law of amplifying the greatest distribution was gained by amplifiers with step-wise and pulse-code modulation, in which approximation of the amplified signal is done by step-wise function. This operation is carried out directly in the output cascade of amplifying.

Key amplifiers in comparison with amplifiers of continuous action have higher efficiency, however they possess also higher level of non-linear distortions, and owing to what at high requirements to accuracy of the set law of change of current it is preferable to use the amplifiers of continuous action. The reprogrammable SPC was developed for







