

Referee report on the paper  
Multivalued groups and Newton polyhedron  
by V.G. Bardakov and T.A. Kozlovskaya

On the set of complex number  $C$  it is possible to define  $n$ -valued group for any positive integer  $n$ . The  $n$ -multiplication defines a symmetric polynomial  $p_n = p_n(x, y, z)$  with integer coefficients. By the theorem on symmetric polynomials, one can present  $p_n$  as polynomial in elementary symmetric polynomials  $e_1, e_2, e_3$ . V.M. Buchstaber formulated a question on description coefficients of this polynomial. Also, he formulated the next question: *How to describe the Newton polyhedron of  $p_n$ ?* In the present paper the authors find coefficients of  $p_n$  under monomials of the form  $e_1^i e_2^j$  and prove that the Newton polyhedron of  $p_n$  is a right triangle.

The manuscript is written in understandable manner but contains many stylistic mistakes in English. All conclusions are mathematically correct. Obtained result is interesting. I recommend the paper for publication in the Siberian Electronic Mathematical Reports after language errors are corrected.

Minor remarks:

last line of the Abstract: “an right triangle” → “a right triangle”

p.144, line 2 from below: “its generalization  $n$ -simplex equations” → “its generalization,  $n$ -simplex equations”

p. 145, lines 6-7: Incorrect word order in a sentence, there should be “In Section 5 of this paper,  $n$ -valued groups were constructed on the set of complex numbers  $C$  for any natural  $n$ ”.

p. 145, line 7: “is describe” → “is described”

p. 145, lines 12-13: Need to rewrite the sentence as follows “In [1] two questions were formulated on the description the coefficients of  $P_n$  as well as a question on the Newton polyhedron of  $p_n$ ”.

p. 145, line 14: There should be “In the present paper we find the coefficients for monomials of the form  $e_1^i e_2^j$  in  $P_n$ .”

p. 145, line 15: “on the first two questions” → “to the first two questions”

p. 145, lines 20-21: There should be “This is the complete answer to the third question.”

p. 146, lines 5-1 from below: “next” → “following” (if there was only one question, we could write “The next question...”, but there will be 3 questions). Also, I suggest to remove title “**Question.**” by same reason (there are actually three questions). It is better to write each question on a new line.

p. 147, line 15: “on the first two questions” → “to the first two questions”

p. 147, line 2 from below: Please rewrite is as “Hence, we have found the following coefficients in  $p_n$ .”

p. 148, line 7: “It is not true” → “This is not true”

p. 148, lines 12-13: “a full answer on the third question” → “a complete answer to the third question”

p. 148, line 13: “Recall the need definition” → “Recall the necessary definition”

p. 148, line 16 from below: There should be “To find Newton polyhedra for polynomials  $p_n$ , consider them for small  $n$ :”

p. 149, line 15: “hence contains” → “hence it contains”

p. 149, line 12 from below: “Hence, the answer to the third question of V.M. Buchstaber follows from Theorem 1.”

p. 149, line 4 from below: “polynomial on elementary symmetric polynomial” → “polynomial in elementary symmetric polynomials”

p. 149, line 2 from below: “connection” → “the relation”

p. 150, line 2: “on” → “about”

p. 150, lines 4-7: There should be “Since there is a homomorphism of one multivalued group to another multivalued group and the kernel of this homomorphism is defined, we can talk about extensions of multivalued groups. Construct a theory of extensions of multivalued groups.”