

2008 TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY : Mathematics

PROJECT : A method of searching for all the integer solutions of any equation of markov's type of paralolic type

AWARDS : Mathematics First Award

SCHOOL : Liceumw110n.a.L.K.Grishina

FINALISTS : Iliya Polotskiy

COUNTRY : Russian Federation

**Working out the method of searching for all the integer solutions
of any equation of Markov's type of parabolic type**

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Annotation

This work presents fundamental research in the field of algebra and the theory of number. The subject of the work is equations of Markov's type (the type of the equations introduced by me earlier which generalizes the classic equation of Markov ($x^2+y^2+z^2=3xyz$)) of parabolic type with two unknown quantities and their genealogical trees. The following questions appeared when I was working on the equations of Markov's type and constructing genealogical trees to them: are there any other trees besides one for a certain equation; how to find all the genealogical trees for the equation of Markov's type; how to find all the integer solutions with the help of the genealogical trees. This work is devoted to the analysis of these questions.

The aim of the work: to create the method of finding all the integer solutions of the equations of Markov's type of parabolic type.

The tasks of the work:

1. Carrying out some experimental works to find all the genealogical trees for a concrete equation.
2. Formulating a hypothesis that the curve has a specific part.
3. Research the parabolic type in order to apply the hypothesis to it.
4. To formulate and prove the theorems about the necessary and sufficient conditions of the existence of the genealogical trees of the integer solutions of equations of Markov's type of parabolic type with two unknown quantities.

As the result of the work all the tasks have been solved. I worked the method of finding all the integer solutions: *: to find all the integer solutions by means finding all genealogical trees of the equations of Markov's type of parabolic type with two unknown quantities you need :*

1. *To investigate if there any integer solutions*
 - *a special part of the parabola (if it is a parabola)*
 - *a special part of the parallel lines (if it is a pair of the parallel lines)*
2. *To build a genealogical tree from every solution (if they exist).*
3. *All the integer solutions will be on the constructed trees.*

I also worked out a computer program which is based on the usage of this method.

評語

Russian mathematics has along and rich history. V.I. Arnold once said that “Mathematics is a part of physics. Physics is an experimental science, a part of natural science. Mathematics is the part of physics where experiments are cheap.” It is difficult for people brought up in this part of the world fully understand such a view. Now after seeing the author’s performance, we gain a better understanding of the statement. In the written report we see nothing related to “application of mathematics”. But at the conclusion the concrete demonstration of author results applied to the field of Cryptography gives a fully picture of the exploration.