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THE EVOLUTION OF THE METHODS OF SOLVING DIOPHANTINE EQUATIONS

The indeterminate or Diophantine equations are the main subject of mathematical discipline such as the theory of numbers. They have been known since ancient times and scientists were engaged in their research during all historical development of mathematical science. Solving equations in integers is one of the most ancient mathematical problems. All the time there was a need to find methods for solving Diophantine equations as there is no general method of solving such equations.

Diophantine equations are called algebraic equations with several unknowns, all coefficients of which integers are, and unknown variables can acquire only integer values. Usually such equations have more than one unknown, and therefore they are also called indeterminate. The simplest linear Diophantine equation is the equation of the form:

$$ax + by = c, \text{ where } a, b, c \in Z, \quad (1)$$

that is, the indeterminate equation of the first degree with two unknowns [4]. The method of scattering, the method of continued fractions, the method of reduction to congruence relation and so on are the most common methods for solving equations of this kind.

The method of scattering has been known since ancient times. The hints of the general solution of Diophantine equations of the first degree were first noticed in the writings of the Indian astronomer *Aryabhata* (476-550), the solving of such equations was more precisely laid out by Indian mathematicians *Brahmagupta* (598-668) and *Bhaskara* (1114-1185). The general method of solving Diophantine equations of the first degree with integer coefficients in integers was called the scattering method in India, because the indeterminate equation is reduced to a chain of equations, the coefficients of which in absolute value decrease with each time, until one of them attain the unit [3].

The indeterminate equation (1) is considered in the book of French mathematician *Claude-Gaspard Basche de Meziriac* (1581-1638) in the 17^{th} century and its solution is reduced to a sequential calculation of incomplete particles and consideration of approach fractions. The continued fractions to the solution of such equations were applied in an obvious form by *Joseph-Louis Lagrange* (1736-1813) in the 18^{th} century [1].

The method of reduction to congruence relation for solving linear Diophantine equations appeared much later than the method of continued fractions, namely in the 18^{th} century beginning with *Johann Carl Friedrich Gauss* (1777-1855) [2].

Diophantine equations can also be of higher degrees and for their solving we have to apply such methods as the method of using prime factorizations, the method of comparison remainders from division left and right parts on a certain number, method of the infinite descent etc.

So, there are various methods for solving the Diophantine equations that appeared and improved during the entire historical development. As the general method of solving such equations does not exist, in this article we have considered the most common methods for solving indeterminate equations.

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