



8th International Conference on Recent Advances in Pure and Applied Mathematics (ICRAPAM2021)

SEPTEMBER 24-27, 2021, Goddess of Bodrum Isis Hotel, Bodrum/Muğla, TURKEY
www.icrapam.org

Diophantine m-tuples and some related problems

Sadek BOUROUBI

USTHB, Faculty of Mathematics, L'IFORCE Laboratory, Algiers

Abstract: The Greek mathematician Diophantus of Alexandria was the first one to study the problem of finding four numbers such that the product of any two of them increased by unity is a perfect square. He found a set of four positive rationals with this property:

$$\left\{ \frac{1}{16}, \frac{33}{16}, \frac{17}{4}, \frac{105}{16} \right\}$$

Indeed, we have

$$\frac{1}{16} \times \frac{33}{16} + 1 = \left(\frac{17}{16} \right)^2, \quad \frac{1}{16} \times \frac{17}{4} + 1 = \left(\frac{9}{8} \right)^2, \quad \frac{1}{16} \times \frac{105}{16} + 1 = \left(\frac{19}{16} \right)^2,$$

$$\frac{33}{16} \times \frac{17}{4} + 1 = \left(\frac{25}{8} \right)^2, \quad \frac{33}{16} \times \frac{105}{16} + 1 = \left(\frac{61}{16} \right)^2, \quad \frac{17}{4} \times \frac{105}{16} + 1 = \left(\frac{43}{8} \right)^2.$$

However, the first set of four positive integers with the above property $\{1, 3, 8, 120\}$ was found by Fermat.

The problem of the construction of Diophantine m-tuples, has a very long history. There are some new results in this area, some related problems are solved, but many conjectures still remain unsolved. In this presentation, we present the main problems and some results concerning Diophantine m-tuples.