Acta Societatis Mathematicae Latviensis
Abstracts of the 5th Latvian Mathematical Conference, April 6–7, 2004, Daugavpils, Latvia

COMPATIBILITY OF POLYIAMONDS

MARGARITA LUKJANSKA

University of Latvia

Raiņa bulvāris 19, LV-1586, Rīga, Latvia

E-mail: mitinja@one.lv

Historical information. The history of polyominoes began with the report of Solomon Golomb (1953) and the following publications. Polyiamonds are less investigated than their more known relatives of polyominoes. The basic element of polyiamonds is an equilateral triangle while the basic element of polyominoes is a square. The terms *polyiamond, pentiamonds, hexiamonds* etc. were suggested by Thomas O'Beirne (Glasgow) [1]. The notion *compatibility* (for polyforms) was suggested by Andrejs Cibulis (University of Latvia). Later the publications [3; 4] on compatibility of n-ominoes when $n \leq 5$ followed. However, there are very few publications on this problem. Compatibility of polyiamonds is a very difficult and challenging problem of the combinatorial geometry. Michael Reid has considered the compatibility of hexiamonds. His findings are given in Puzzle Fun by Rodolfo M. Kurchan [2]. The divisibility properties of polyiamonds can be studied in the similar way to the ones of polyominoes [3; 4]. The author's results on compatibility of tetraiamonds, pentiamonds and hexiamonds were presented at the 15th European Union contest for Young Scientists. From 171 examined pairs of polyiamonds the compatibility can be shown for some 92 percents of them. As far as it is known a compatibility of other polyiamonds is not investigated till now. Report on this subject will be presented also at the London International Youth Science Forum 2004.

Notions. *Polyiamonds* are connected plane figures formed by joining unit triangles edge to edge. If a polyiamond consists of n triangles, it is called *n-iamond*. If two figures have a common multiple, they are said to be *compatible*. A *least common multiple* of two figures is a common multiple with the minimum area. All tetraiamonds are compatible with one another and the same refers to all pentiamonds. The known common multiple of the I-hexiamond and the V-pentiamond consists of 30 hexiamonds. For the time being it is not known whether another pair of hexiamonds would require such a large polyiamond to prove its compatibility. One of the open problem is as follows: find a common multiple of A-hexiamond and S-hexiamond - the shapes given in Fig. 1.

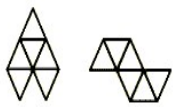

Figure 1.

REFERENCES

[1] T.H. O'Beirne. Puzzles and paradoxes. *New Scientist*, (224), 1961, 560 – 561.

[2] R.M. Kurchan. Holes pentominoes. *Puzzle Fun*, (6), 1995.

[3] A. Cibulis, A. Liu and B. Wainwright. Polyomino number theory (I). *Crux Mathematicorum*, **28** (3), 2002, 147 – 150.

[4] U. Barbans, A. Cibulis, G. Lee, A. Liu and B. Wainwright. Polyomino number theory (II). In: *Mathematical properties of sequences and other combinatorial structures (Los Angeles, CA, 2003)*, Kluwer Acad., Boston, 2003, 93 – 100.