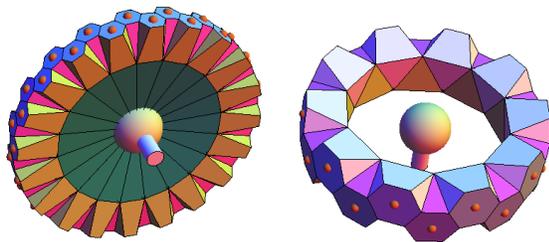


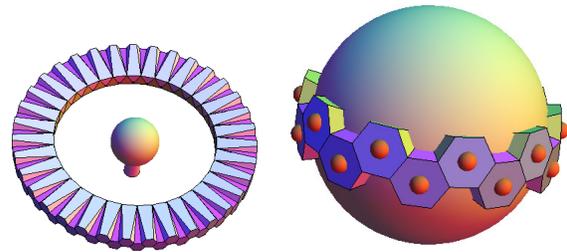
**EXPERIENCE-WORKSHOP IN MATHEMATICS AND SPACE EDUCATION: JOYFUL TEACHING PROGRAM IN HUNGARY.** S. Kabai<sup>1</sup>, K. Fenyvesi<sup>2</sup>, I. Szabó<sup>3</sup>, E. Stettner<sup>4</sup>, L. Szilassi<sup>5</sup>, L. Vörös<sup>6</sup>, I. Lénárt<sup>7</sup>, Sz. Bérczi<sup>8</sup>. <sup>1</sup>UNICONSTANT, H-4150 Püspökladány, Honvéd u. 3. Hungary, (unico@t-online.hu), <sup>2</sup>Jyväskylä University, Jyväskylä, Finland, <sup>3</sup>ANK, Pécs, Hungary, <sup>4</sup>Kaposvár University, Dept. Mathematics, Kaposvár, Hungary, <sup>5</sup>Sezged University, Juhász Gyula College, Hungary, <sup>6</sup>Pécs University, Pollack Mihály College, Hungary, <sup>7</sup>Eötvös University, Institute of Mathematics, Budapest, <sup>8</sup>Eötvös University, Institute of Physics, Budapest, Hungary (bercziszani@ludens.elte.hu)

**Introduction:** During the last years a program of Experience Workshop on Mathematics organized a creative day meetings for teachers and students on the topics of joyful, constructing mathematics. One region of the mathematical construction was the space. The program visited several towns in Hungary where it and resulted in great impact on teachers and students in the region. We report here how these activities helped space relation teaching.

**Example method:** Stimulating curiosity. That is one of the goals in an approach when initially an object is selected, - say a circular array made of modular units. We imagine that this circular structure is a model of a space station. We depict it with the software Wolfram Mathematica, which allows interactive manipulation of any parameter of the graphical object. While designing a space station like this, we can think about the mathematical and geometrical knowledge necessary for the construction, as well as those which can be associated with these. We can associate this structure to many principles, such as algebraic series, polyhedra, golden ratio, symmetries. There is a good chance that the curiosity of student is arisen, and they will gladly make exploration of their own into constructing space stations, and find out about geometry (Fig. 1. and 2.).



*Fig. 1. Pair of corresponding design elements. Designing a space station like this, we can think about the mathematical and geometrical knowledge necessary for the construction.*



*Fig. 2. Pair of corresponding design elements, continuing Fig. 1.*

**Zometool construction:** The space structure building from zometool elements is almost a real astronaut work, when they will construct a great space station skeleton. In constructing the whole frame the first is that you must build the smaller units (Fig. 3.)



*Fig. 3. Students build the polyhedra elements for the superstructure.*



*Fig. 4. Teachers build the superstructure (6 hours work)*



Fig. 5. Teachers of science, mathematics and arts worked together on this space structure in Eger, 2011.

**Fractal and space net construction:** The Wolfram Mathematics Demonstration program gave graphical design method realizing design products by functions. Spatial relations built earlier can be viewed and transformed, from other directions. This program helps students in learning computer design of the basic elements, movements, imagined by the computer graphical representations.

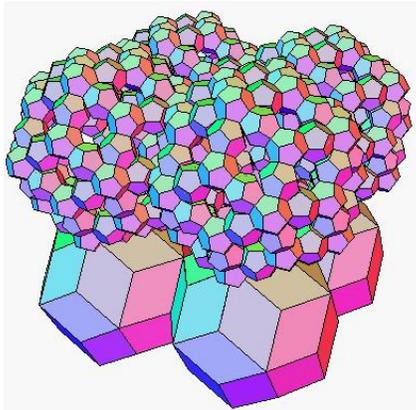


Fig. 6. Spongy material as a fractal variant of the lower polyhedral structure.

**Conclusion:** By Experience Workshop on Mathematics studies great number of students could reach the joyful mathematics by personal activity in space. As a consequence, they will be active at a later school period in construction of space probe models, like Hunveyor.

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