

**Mathematics and Art Workshop  
Isfahan Mathematics House  
And  
Utrecht Mathematics Department**

**May 8-10, 2013**



Workshop on Mathematics and Art (Math-Art) on 8-10 May 2013 was held in Isfahan Mathematics House (IMH). This international Math-Art workshop provided a forum for mathematicians, scientists, artists, historians and students, to work on the interdisciplinary connections between modern mathematics, historical mathematics and art, especially Islamic art.

Also, the workshop was an opportunity to share different research perspectives and to be introduced to the field. Interested scholars and students were warmly invited to participate in this scientific event. The language of the presentations and workshops was English (possibly with translations into Persian).

At the first day of workshop, there were 26 Iranian and 18 Dutch participants. Titles of lectures were:

- Medieval Islamic dimensions of the universe, Jan P. Hogendijk :

*Results provided in this lecture, mostly taken from texts about the size of the universe, computations of the surface area of the sphere of fixed stars in square miles, and so on. This is a continuation of joint work with Dr Bagheri.*

- Shah Gereh & Gereh in Gereh Workshop, Ahmad Montzer & Mehrdad Hejazi:

*This workshop is about "Shah Gereh" and " Gereh to Gereh" and types of them and Discussion about efficient geometrical methods for drawing of them.*

- Persian Tilings in Dutch Classrooms, Goossen Karssenbergh :

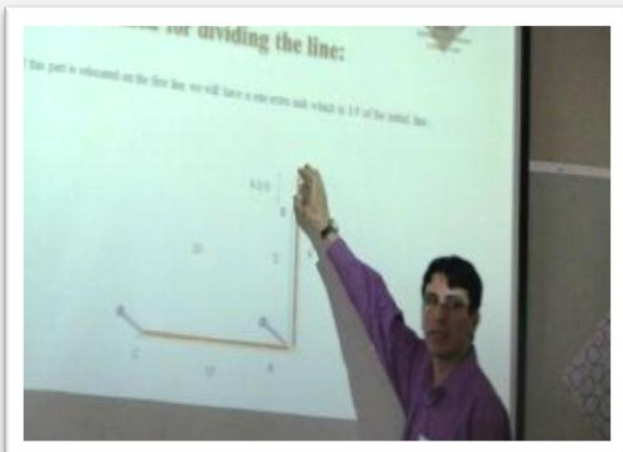
*As a mathematics teacher, we developed a curriculum on Persian Tilings, supervised by Professor Jan Hogendijk. We present our already applied program in many classrooms in Holland.*

- On the Practical Use of Geometry in Triangle Norm, Nima Valibeig

*There are many ways to divided lines, but most of them are not practical. Triangle norm is one practical method that has been introduced by presenter. This workshop shows how to use these*

*methods, using traditional architecture.*

At the end, there was a visit of Jameh Mosque and art exhibition in IMH included Mr.Ghanbari's works (Master Maheronnaghsh's works), and some prominent handmade artworks of Isfahan.



On Thursday-second day of workshop, there were 21 Iranian and 18 Dutch Participants with some workshops and lectures:

- Mare Technique in Shape, Mohamad taghi Tavasoli :

*When two similar one or two dimensional periodical networks are superimposed with a small angle between them, a new periodical network with much longer period appears that is called moiré pattern. In ancient China artists were familiar with the phenomenon and used it to attract audience. But, scientific attention to the effect has begun late nineteenth century. A two dimensional periodic structure, mathematically, can be expressed as a two dimensional network with a motif associated to each unit cell of the network. There are only five different two dimensional networks that are distinguished by the symmetries of their unit cells, namely, parallelograms of different symmetries, while the choice for motif is unlimited. Thus, any two dimensional periodic structure can be decomposed into a network and a motif for study and classification. The wall papers, patterned cloths, and some of the walls and roofs of historical buildings covered with bricks and tiles can be classified in this manner. However, in many rug designs and surfaces covered with tiles and bricks there are complicated axial symmetry, but, not translational symmetry. It has been shown that as two or three, and more two dimensional periodic structures with very simple and similar motifs are superimposed with some angle between successive structures, very beautiful patterns appear with axial symmetry and in some cases also with translational symmetry. It seems that the complex axial symmetry of rugs and tile works can be decomposed and classified by the latter manner. In the talk, after a brief review of the bases of the moiré technique, some noteworthy patterns with axial symmetry are demonstrated and the afore mentioned issues are discussed.*

- Nomographic Solutions of Quadratic Equations, Steven Wepster :

*This workshop is about very efficient geometrical methods that were used before the advent of the pocket calculator, in order to approximately solve equations without computation.*

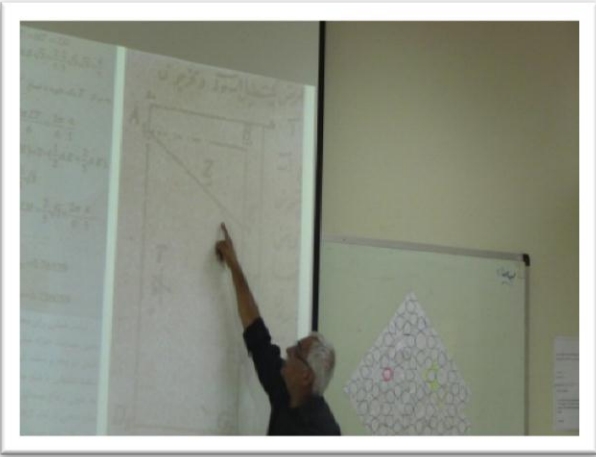
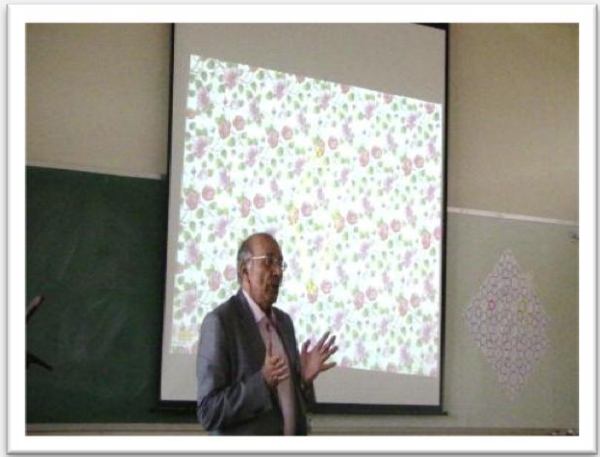
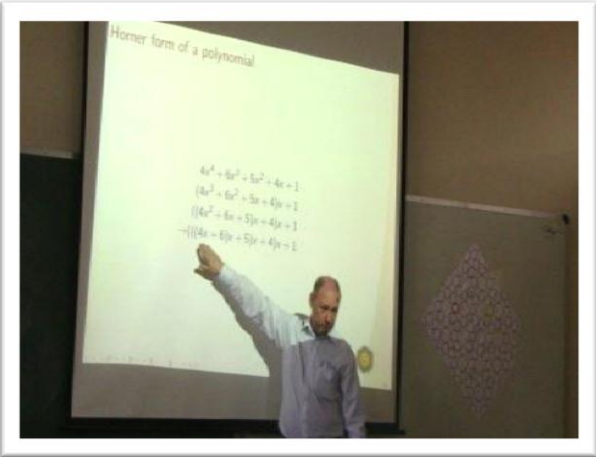
- Mogharnas Workshop, Akbar Zamani :

*Mogharnas is the fascinating outstand design, like the bee house that use entrance arch of the altar and the many mosques and minarets . and then we define any type of Mogharnas with showing pictures and documentary films.*

- Al-Kindi's work on cryptography, Koen van Woerden :

*This is a workshop on analyzing encoded messages according to the methods of al-Kindi (a ninth-century mathematician and philosopher). We have found the medieval Arabic manuscript.*

During visit of exhibition, there was an especial lecture titled "Taylasan Table" by Maxim Rager Faber and Lida Julia Rusch. Also a painting competition was run at the end.





On Friday, the last day, there were 28 Iranian and 18 Dutch participants. Lectures were:

- Penrose Tiling, Mohamad Mamaghani :

*The rest of the Ziggurat-Choghazanbil show that Iranian people of the tenth century BC, was aware of the technology and art. In this workshop the Penn -Rose tiling introduced and some of its features will be considered. Then we will show that how to use the automatic production of tiling with automat.*

- Methods of Drawing in Geometrical Patterns, Bahare Taghavi Nezhad :

*This workshop is based on the more acquaintance, study and discusses on Methods of drawing simple and complex geometrical patterns that are called "Gereh" in traditional arts and architecture decorations of Iran.*

- The Dutch artist M.C. Escher and Geometrical Patterns, Wilfred de Graaf :

*The famous Dutch artist Maurits Cornelis Escher (1898-1972) developed an interest in regular divisions of the plane during his visit to the Islamic Alhambra Palace in Granada, Spain. Escher was astonished by the great wealth of decorations and the dignity and simple beauty of the whole place, and he was inspired to create new patterns based on alternative forms. The workshop is divided into two parts. Part 1 is an introduction to regular divisions of the plane in general. In Part 2 participants learn how to recognize the underlying mathematical structure in the drawings of Escher. Finally we explain a method for creating your own Escherlike patterns.*

- Analysis of a Complex Geometrical Patterns Forming a Complex Modular Unit, Shabnam Vard & Nima Valibeig :

*In this workshop, we will demonstrate a way for constructing some Iranian Geometrical Patterns through analyzing and comparing various construction techniques; It initiates a reestablishment of a forgotten part of an old geometrical science tradition.*

During program, there was a tiling competition between Dutch and Iranian groups. The participants had a visit of Darb e Emam and Mr. Maheronaghs works.



