European Society for Mathematics and the Arts

Newsletter

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Dear Reader,

When using numbers, traditional artists use integer numbers, decimal numbers, among which rational numbers (quotients of two integers). A rational number, like 10/11 *is characterized by the fact that its decimal representation (here 0,9 09 09 09 ...) shows an infinity of successive equal sequences (here 09) of numerals.*

Up to now and as far as I know, artists have not used any other kind of numbers.

However there are infinite families of numbers. Among them, are those I consider and call elementary numbers. In a given n-dimensional space, they represent elementary moves consisting of linear dilatations (homothetic transformations) in the various subpsaces, coupled with rotations (cf http://arpam.free.fr/Du%20nouveau%20...%20Quadrature.pdf).

Such two-dimensional numbers z are usually called complex numbers. I prefer and use the terminology Chuquet numbers. Chuquet was the first to introduce and to use these numbers in the fourteenth century. Introduced and regretted by Gauss himself, one shall underline the exaggerated and unfortunate aspect of the use of the adjective complex.

Such a number z is frequently written as $z = x + iy$ where i represents a $90°$ positive rotation. An other representation is $z = (\rho, \theta)$ where ρ means the dilatation in the 2-space, and θ the rotation in that space. In the usual 3-dimensional space, an elementary number defined by a dilatation specified in one direction together with a rotation is named a Hamilton number or a quaternion.

These elementary numbers represent generic local movements. As we know since Aristotle and the 18th century French mathematician Liouville, the standard local movements are composites of two singular moves, the rectilinear and the circular ones. Thus these *generic local movements do have an immediate physical significance : they are commonly used by physicists, but usually without any kind of justification.*

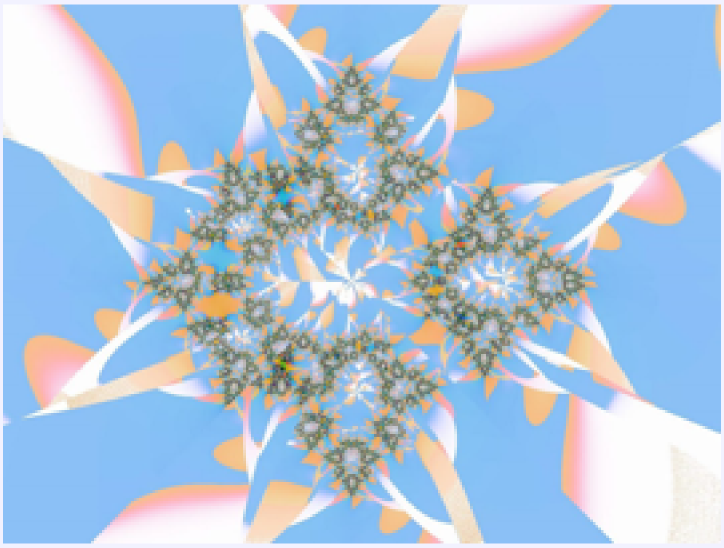
Artistic use of these numbers by mathematicians has given rise to pictures and images which are quite new for traditional artists. Here is an (undoubtedly incomplete) list of authors of beautiful images arising from the use of Chuquet numbers :

Tom Banchoff, Geraud Bousquet, Jérémie Brunet, Jean-François Colonna, Mike Field, Jos Leys, Mikael Mayer, Patrice Jeener.

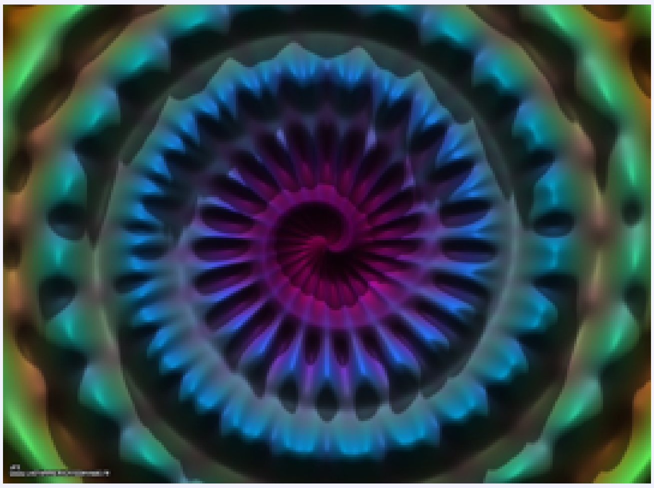
The reader is invited to look at their website. He will here find images made by Jean-François Colonna, Mike Field, Michael Mayer and Patrice Jeener. The next Newsletter will shortly give a hint to justify the special interest of physicists for complex functions called holomorphic. Images by Tom Banchoff, Geraud Bousquet, Jérémie Brunet and Jos Leys will then appear.

Note that all of these images are 2-dimensional. But one could construct height functions $w = h(x, y)$ or $w = g(\rho, \theta)$ and get new 3-dimensional objects.

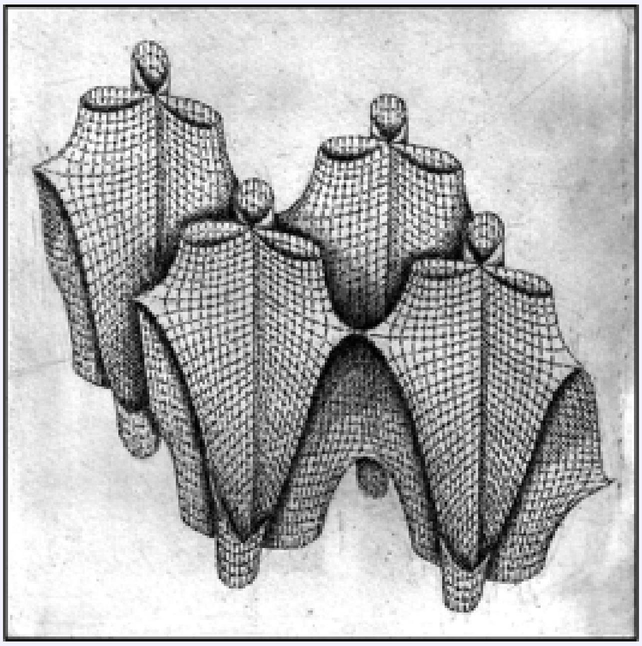
Best wishes,
Claude



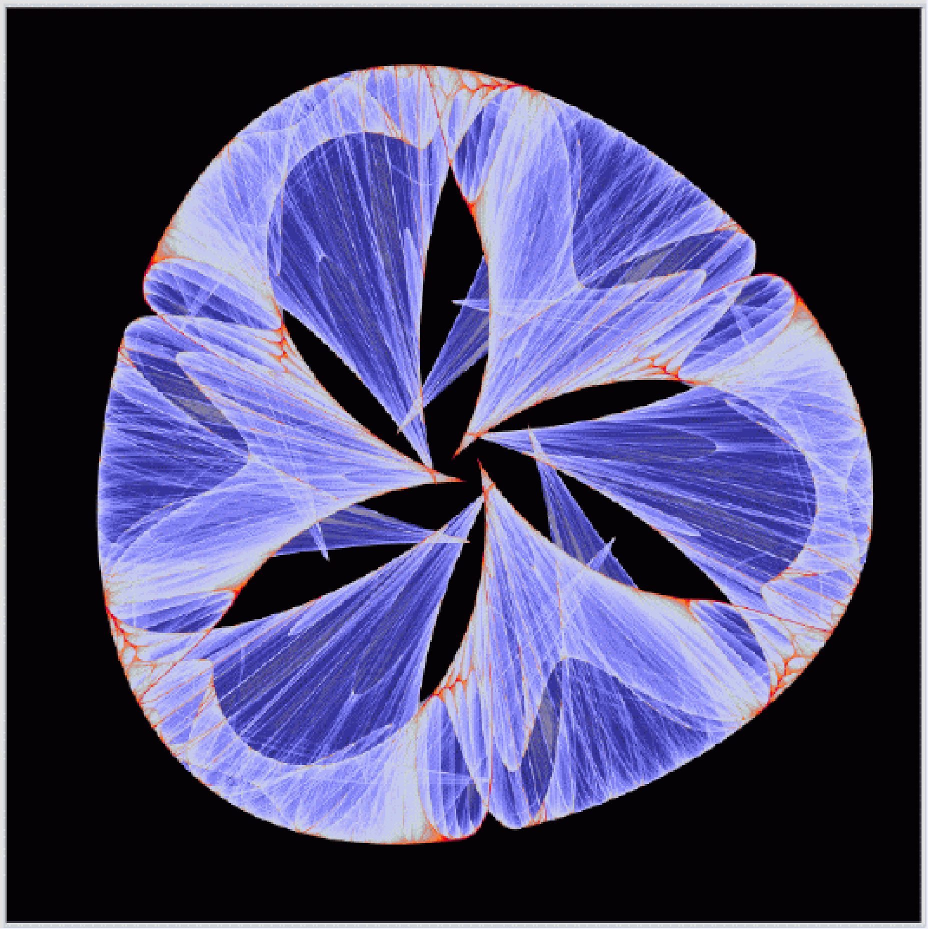
Mikael Mayer : $oo(((0.3 + 1.28i) * (argch(arcsin(exp(x))) * x/exp((3.16 - 2.44i) + y))$ $+\mathrm{argsh}(\mathrm{z}^4 - z^z)) * argch(z^{-4}))/2.6) * 0.5j$
https://plus.google.com/photos/102014571179481340426/albums/5204587252111252049



Jean-François Colonna : Coquillage quaternionique
http://www.lactamme.polytechnique.fr/images/QUAT.D1.D/display.html



Patrice Jeener : Fonction elliptique P' de Weierstrass
$P' = -2/z^3 + g2z/10 + g3z^3/7 + ...$
My Mathematical Engravings in Mathematics and Modern Art
(C.P. Bruter Ed.) Springer 2012



Mike Field : Ghosts
http://math.rice.edu/ mjf8/ag/icons/icons.html
Symmetry in Chaos, Oxford University Press, 1992

Claude Bruter, Publisher. Contributors: Sharon Breit-Giraud, Jean-François Colonna, Richard Denner, Mike Field, Patrice Jeener, Jos Leys, Mikael Mayer.
Website: http://www.math-art.eu