

⌘(ALEPH)-STRUCTURES (DIAGONAL AND VARIABLE FRAME STRUCTURES)

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This presentation propose new variable structure systems which could make constructions of domes towers space-structures more easily.

⌘(aleph)-structures(named by Koji Miyazaki), are variable structure systems which are composed of diagonal frames taken out from trapezoids.

Using this system, you can easily fold up all kind of shapes, domes (double layer Fuller domes) towers (also bridges) space structures all regular and semi-regular polyhedron etc., into linear or planary compact shapes without losing solidity during transformation.

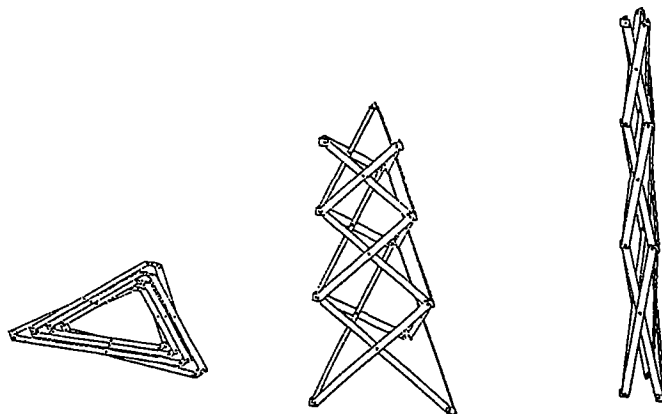
Adding tension component to its expanded form, this structures will be 3D-truss and they get effective strength.

(International Patent Pending)

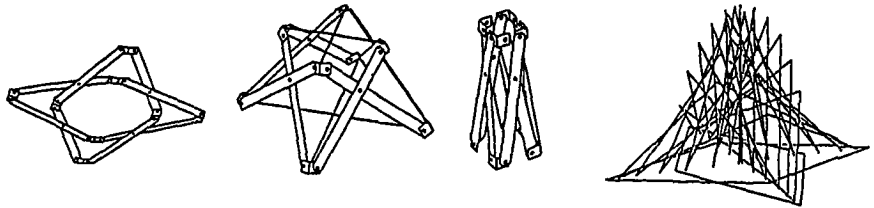
Those structure systems are one of the application of higher-dimensional geometry.

⌘ express the diagonal shapes and their mathematical propaties.

We should study of its intensity and details of joints, to realize a architectural scale. All figures of aleph structures in this paper are computer-graphics of the simulators which are written in 3Dlogo-SURF on MS-DOS by the author.



An aleph tower
It can be continued infinitely (⌘ units finally) in finito space.



A primary unit of aleph structures
 These structures transform inter-
 dimensionally from 2 (plane)
 to 3 (solid) finally 1 (linear).

During transformation its top view is
 reduced keeping similar shapes. Its height
 is expressed in next formula.

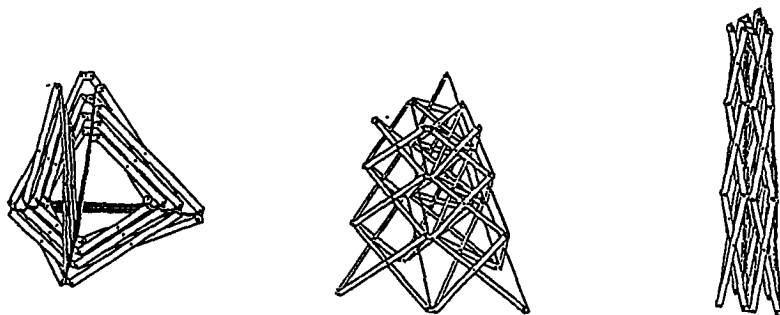
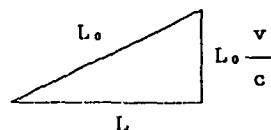
where

$$H = L \sqrt{1 - r^2}$$

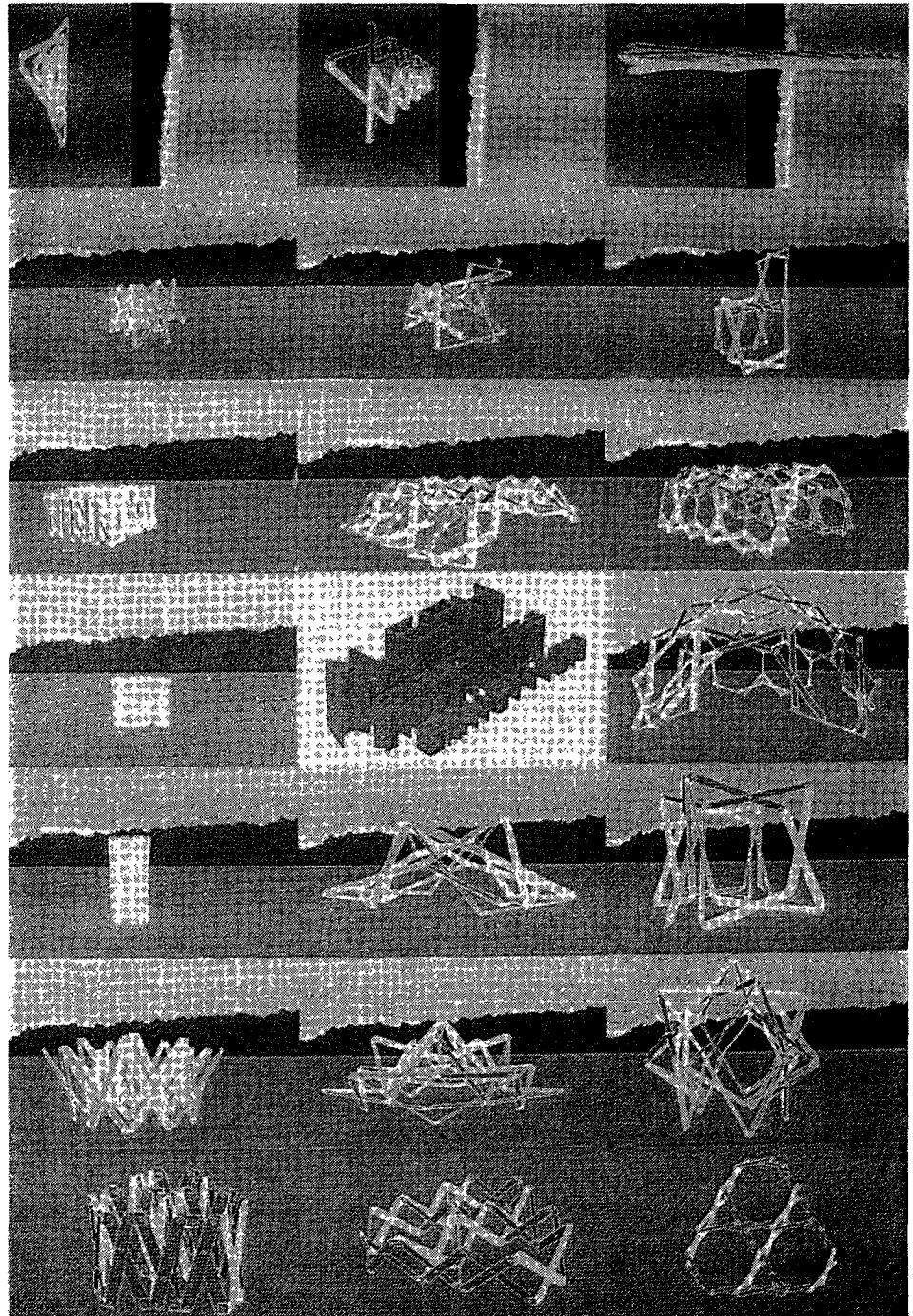
H	height of the structure
L	real length of diagonal
L'	length of its top view
L	(projection)
r	reduction ratio

* A very interesting thing is this formula
 is just like the famous one of Lorentz
 transformation in theory of relativity.
 If $r = v/c$ instead of L'/L the formula is
 almost the same.

We guess Lorentz transformation is
 understandable to think of only a development
 of the Pythagoras theorem between two space
 (with stillness and with uniform velocity).
 crossing in 4D-space.
 The figure is next.



An aleph tetrahedron (4-dimensional)
 This figure shows extracting the 4th-axis



ALEPH STRUCTURES EXHIBITION by ATAKE KATSUHITO

Former page is the postcard of Aleph structures exhibition. It was held in Gallery Hilbert-space Nagoya Japan from march 26 to may 31 in 1985.

Level figures show transformation of same structure

Titles from up to down

An aleph tower

An aleph chair

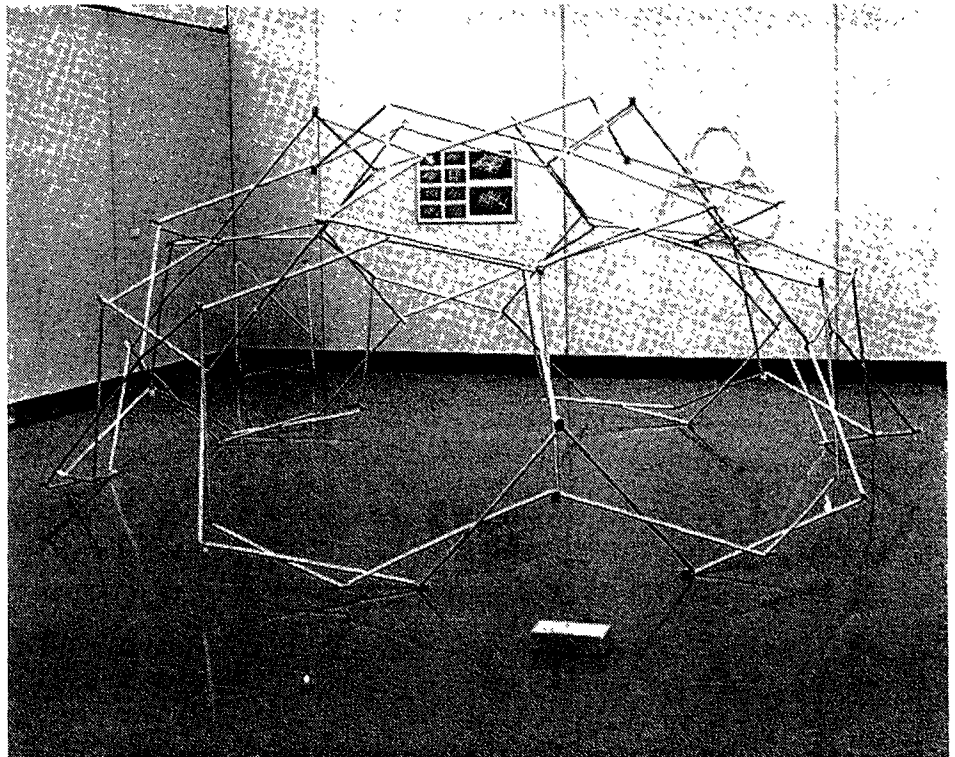
An aleph vault

An aleph dome
(an upper half of semi-regular dotariaconta-hedron or a kind of double layer Fuller dome)

An aleph cube (4-dimensional)

An aleph cube
(5-dimensional cube or icosahedron (finally))

An aleph space truss (triangular type)



An Aleph dome in Cosmology of light and form exhibition at Hyogo prefectural museum of modern art, Kobe.