

[Utopian vs Realistic]

Buckminster Fuller

- Geodesic domes
- Post-war houses
- Utilization of resources
- Maximum volume covered in minimal surface



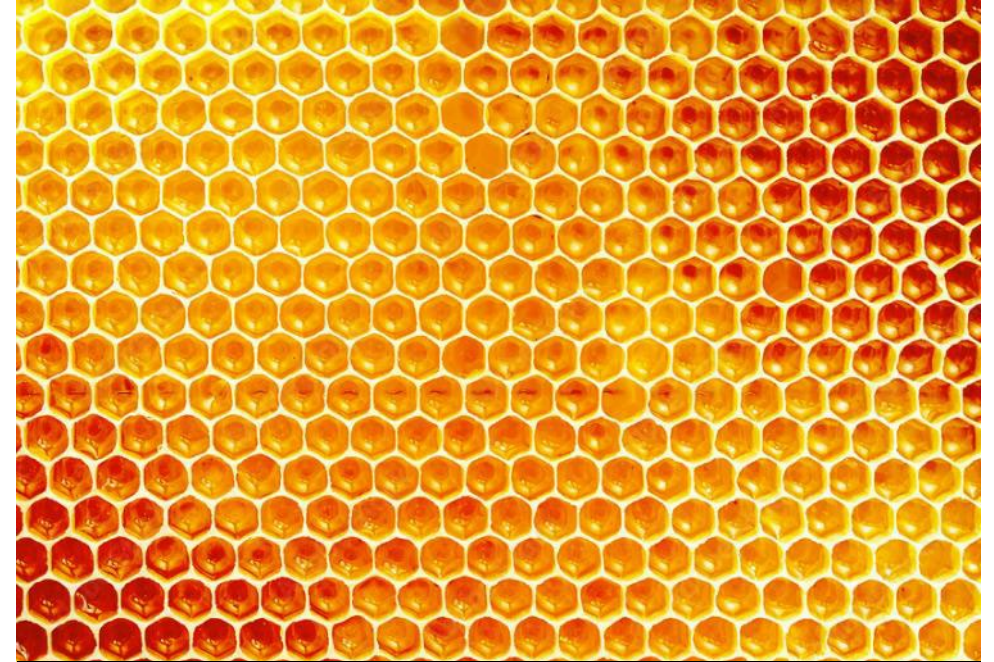
Geodesic domes, Buckminster Fuller



Montreal Biosphere, Buckminster Fuller

Honeycomb

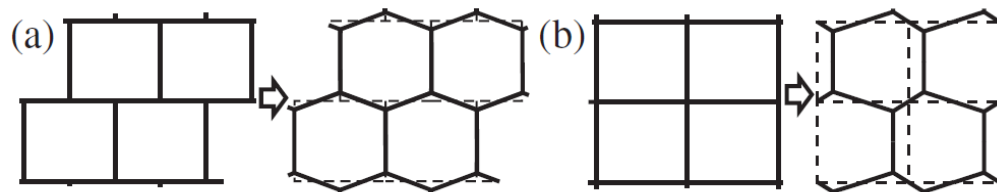
- Hexagonal prisms
- Natural habitat
- Utilization of resources in communal living
- Maximum volume covered in minimal surface WHILE leaving no gaps



Honeycomb



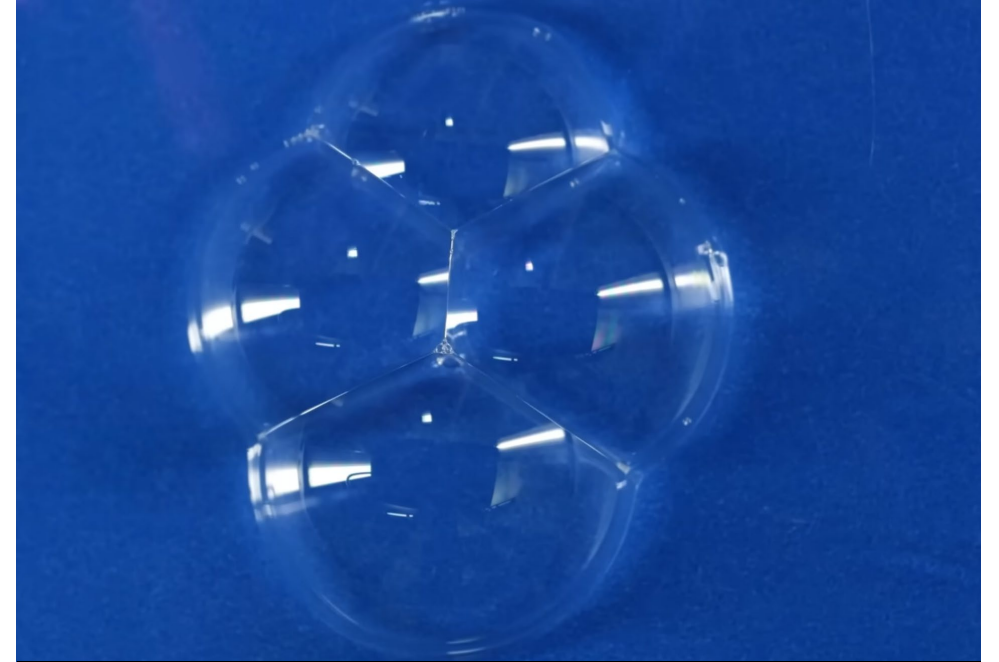
Columnar jointing, Giant's Causeway



Why Hexagonal Basalt Columns? Physical Review Letters 2015

Stacking of Bubbles

- Bubbles squeezing to find equilibrium
- Physics phenomenon
- Utilization of resources in 3-dimensional space
- Maximum volume covered in minimal surface WHILE leaving no gaps
- Translated into architecture
- Inspiration for Water Cube, Beijing



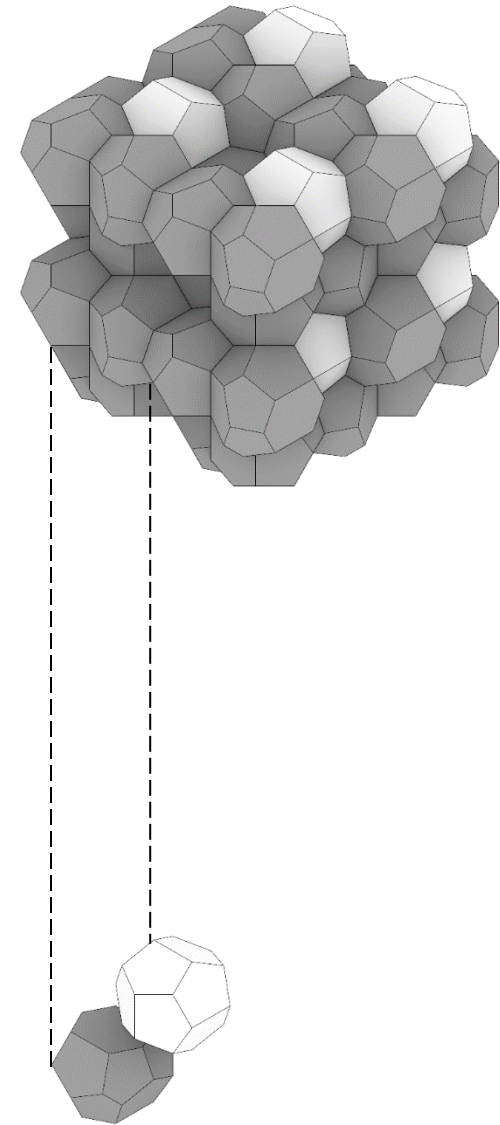
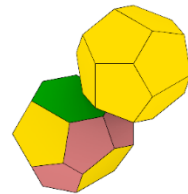
https://youtu.be/Pypd_yKGYpA?si=J-e7QVRiLDzwKXYL



Water Cube, Beijing

Utopian Future of Lunar Habitat

- Weaire-Phelan structure
- Mathematical model
- Utilization of resources in 3-dimensional space
- Maximum volume covered in minimal surface WHILE leaving no gaps



Modular Housing

- High density housing habitats on the moon
- Efficient space-packing
- Ramot Polin Housing
 - Impractical on Earth
 - Unusable walls
 - Slanted windows
- Opportunities on the moon



Nakagin Capsule Tower, Tokyo



Ramot Polin Housing, Israel

Nomadic Architecture

- A provocation to challenge our degrees of liberty in the urban environment
- Inhabiting the city means being at home everywhere



Man-egg-spheres, Ugo La Pietra



Restless Sphere, Coop Himmelb

Rolling Architecture

- Roll It experimental housing
 - Flexible space within a minimum housing unit
- What if the housing module can roll
- While the orientation of people inside can adapt freely



Roll It experimental housing, University of Karlsruhe



Ramot Polin Housing, Israel

[Human Activities in Micro-gravity]

Orientation

- Orientation in microgravity
 - Lost of the sense of up and down
- “Enjoy being in in a module, that is really 3D, where there is no ceiling or floor.” Clervoy, (2009) comment on Mir space station
- Stowage and object management
 - Insufficient stowage available
 - All modules of Mir were used to store equipment that was not used anymore and only a small corridor was left free
- Finding and losing objects
 - They don't fall down like they would on Earth



Lost of orientation in microgravity, Architecture for Astronauts

Assistance to moving

- Floor covered with Velcro to aid moving around
 - Apollo, Salyut
- Triangular grid on wall and ceilings/floors to ease moving around
 - Skylab
- Multiple restraint straps
 - Apollo, Shuttle, Mir, ISS
- Design leisure activities that integrate restraints



Velcro on shoes, NASA



Velcro on gloves, NASA