Masuod Akbarzadeh, J Comput Eng Inf Technol 2017, 6:6(Suppl)
DOI: 10.4172/2324-9307-C1-017

On geometry and equilibrium of forces in 3D

Masuod Akbarzadeh
University of Pennsylvania, USA

Geometry is commonly known as a branch of mathematics concerned with questions of shape, size, the relative position of figures, and the properties of space. Fewer know about the importance of geometry in physics and equilibrium of forces. This presentation will expand on the use of geometry in describing the static equilibrium of the complex spatial system of forces, and more importantly, how it would help structural designers and architects to design highly efficient structures. This branch of science is called graphic statics where the equilibrium of forces in a structural form is described geometrically/graphically. The geometric representation of forces provides an unprecedented control for designers to not only design the geometry of the system, but also design and optimize its internal forces. Traditional graphic statics is based on 2D reciprocal diagrams formulated by Maxwell in 1864 and is quite limited in dealing with a 3D system of forces. This presentation will specifically expand the current research of the author and show the new development of graphic statics in 3D based on a 150-year proposition by Rankine in Philosophical Magazine. In addition, it shows how the well-known computer graphic techniques such as aggregation/or subdivision of polyhedral cells can be used in 3D graphic statics and to generate non-conventional, expressive efficient structural forms.

Biography

Masoud Akbarzadeh is a designer with a unique academic background and experience in architectural design, computation, and structural engineering. He is an Assistant Professor of Architecture in Structures and Advanced Technologies and the Director of the Polyhedral Structures Laboratory (PSL). He holds a DSc from the Institute of Technology in Architecture, ETH Zurich, and two degrees from MIT: a Master of Science in Architecture Studies (Computation) and a MArch, the thesis for which earned him the renowned SOM award.

masouda@upenn.edu

Notes: