Giuseppa di Cristina (ed.)

Architecture and Science

(London: Wiley-Academy, 2001).

Reviewed by Michael Chapman

Rather than, as the title suggests, providing evidence of scientific trends in modern architecture, *Architecture and Science* is a compilation volume of recent articles from the AD journal associated primarily with what is now widely referred to as the topological movement in architecture. Topological architecture, or “De-formation”, follows in the wake of Deconstruction and relies on contemporary computer animation techniques to give plasticity and malleability to architectural form. Encompassing work from the last decade, the book features designs from architects as diverse as Peter Eisenman, Frank Gehry, Greg Lynn, Daniel Libeskind, Bahram Shirdel and Ben van Berkel as well as texts by Kenneth Powell, Jeffrey Kipnis, John Rajchman, Brian Massumi, Karen A. Franck and Michael Speaks. Lavishly illustrated and broadly informative, the book provides a good backdrop for understanding contemporary trends in recent architectural theory and practice and provides a thorough summary of a movement now in its twilight.

In the opening essay of the volume, editor Giuseppe Di Cristina describes what she terms the “topological tendency in architecture”:

Architectural topology means the dynamic variation of form facilitated by computer-based technologies, computer-assisted design and animation software. The topologising of architectural form according to dynamic and complex configurations leads architectural design to a renewed and often spectacular plasticity, in the wake of the baroque and of organic expressionism.

The topological movement represents a conscious attempt to move beyond the jarring geometry of Deconstruction and its emphasis on the diagonal. The Deconstruction movement, which fathered many of the proponents of this new school was grounded firmly in what Greg Lynn refers to as the “contradictory logic” of Jacques Derrida. The topological, or Deform movement represents a deliberate shift from Derrida’s discourse to that of Deleuze. Its intention is to incorporate, rather than exaggerate difference. This involves a policy of “gratification” rather than conflict and seeks to develop systems to incorporate various elements in an architecture intended to be inclusive and organic. The requirement is thus for a geometry which is elastic in its ability to contort and deform in a process of continual transformation.

Included in the volume is an extract from Gilles Deleuze's controversial but now classic work "The Fold: Leibniz and the Baroque", in which he draws parallels between the philosophy of Leibniz and the expressionism of the Baroque movement. His remark that "the smallest element of the labyrinth is the fold, not the point" is quoted monotonously throughout the volume as a basis for the rejection of Cartesian geometry in favour of neutral and singular architectural systems. Deleuzian terms such as affiliation, pliancy, smooth space and striated space are now currency within the architectural terminology that accompanies the movement.

Another constant in topological architecture are references to the Catastrophe theory of Rene Thom and in particular his catastrophe diagrams. Catastrophe Theory concerns itself with attempting to, according to Lynn, "deploy disparate forces on a continuous surface". The diagrams are used to generate geometries which "bend and stabilise" under pressure. Reminiscent of Deleuze, Lynn describes how in catastrophe theory "there is not a single fixed point at which a catastrophe occurs but rather a zone of potential events". Kipnis's essay "Towards a New Architecture" argues that these diagrams help "avoid the pitfall of expressionist practices" offering a "level of discipline to the work" through the rigour of regulating lines. These diagrams have been influential in the design of several key topological buildings, including Peter Eisenman's Robstock Park and Bahram Shirdel's Nara Convention Centre, both featured in the volume.

The geometry developed in association with the theoretical investigations of the movement is heavily dependent upon computer technology for its realisation. Michael Speaks points out that the revolution is not so much in architectural form, as in architectural practice. Through the use of what is known as "anexact" geometry computers are able to model forms previously prohibited in traditional architectural practice. Anexact geometry involves non-developable forms, or forms that cannot be flattened. As a result, and in contrast to Euclidean geometric forms, it is impossible to describe such forms in the form of an algebraic equation. Lynn describes abstract geometries as those that "can be determined with precision yet cannot be reduced to average points or dimensions."

The geometries described by topology however are not constant but in a state of continual transformation, capable of absorbing or reacting to changes in environment. Topology itself is taken to mean those elements that remain constant as the entire system undergoes change, or, according to Marcus Novak "those relations that remain constant under transformations and deformations."

One of the essential contradictions involved in the use of computer animation to produce architectural forms is that the final resolved product doesn't retain the same movement and flexibility. Michael Speaks essay "It's Out There" addresses this quandary, referring to the Anywise conference where Greg Lynn was asked why his architecture, like his imagery, is not animate. Lynn refers, somewhat unconvincingly, to the difference between stable and static states. Static states are those of traditional Euclidean geometry, while stable states are those that, whilst still essentially static, are capable of changing into

other states. Such forms, according to Lynn, are intended to induce the feeling of animation while remaining essentially static. Massumi also lends his weight to the discussion in his essay “Strange Horizon” where he argues that it is perception which is itself abstract and induces movement, regardless of architectural form. However the chasm between the seductive computer modelling (prevalent throughout the book) and the built equivalent (noticeably absent) is pronounced. In a critique recurrent throughout the volume, Michael Speaks concludes that Lynn “is only able to offer animate techniques which produce, in the end, forms which seem no more animate than those he sets out to surpass.”

One of, if not the only, seminal work so far to be built by the movement is the FreshH₂O eXPO built in Zeeland, the Netherlands by NOX Architects. Generally known as the Fresh Water Pavilion, the form of the building attempts to simulate fluidity through the liquid deformation of a series of ellipses over a length of more than 65 metres. Whilst complying with all relevant disabled codes, the complex form uses no horizontal elements at all and every slope in the building is of a continually changing gradient. The result is an enveloping curved interior strongly evocative of the fluidity of flowing water. The building remains one of the pivotal achievements of the movement and one of few built relics.

The real strength of the building however is its ability to integrate technology with human interaction. Utilising human sensors to trigger projections and simulations as the individual moves through the building, the architects employ a range of materials from rubber and cloth to ice, mist and water to simulate a fluid interior. This kind of interface is central to Stephen Perella’s conception of “Hypersurface Theory.” This represents an attempt to render walls not as spatial demarcations, but as avenues of information with layered depth and cultural definition. Fundamental to this is his fascination with the increasing cultural consumption of architectural forms by advertisement, LCD screens and human sensors such as the Fresh Water Pavilion. Ultimately architecture becomes replaced by technology and the wall becomes an interface, or ceases to exist entirely. In a poignant essay at the end of the volume Karen A. Franck alludes to the potential disembodiment associated with such visually saturating spaces which exclude other human senses and provide a rupture between the body and space.

By drawing together key essays from a diverse and often contradictory range of sources the book provides a thorough introduction to the concepts of topology in architecture. The volume is readable and at times insightful and provides a convenient and balanced introduction to the material. The seductive imagery and intriguing diagrams reinforce both the strengths and weaknesses of the movement and its continual struggle with reality and relevance.

About the Reviewer

Michael Chapman is based at the University of Newcastle, Australia, and is currently completing postgraduate research on architecture and the philosophical writings of Friedrich Nietzsche.