

S t u d e n t s

数字建构

学生建筑设计作品

(Im)material Processes New Digital Techniques for Architecture

[英] 尼尔·林奇
Neil Leach

徐卫国 编
Xu Weiguo [eds.]

中国建筑工业出版社
CHINA ARCHITECTURE & BUILDING PRESS

图书再版编目 (CIP) 数据

数字建构 学生建筑设计作品/[英]林奇;徐卫国编.

北京:中国建筑工业出版社,2008

ISBN 978-7-112-10396-6

I. 数… II. ①林…②徐… III. 建筑设计:计算机辅助设计—作品集—世界—现代 IV. TU206

中国版本图书馆CIP数据核字(2008)第149008号

责任编辑:张 建

责任校对:兰曼利 关 健

数字建构 学生建筑设计作品
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New Digital Techniques for Architecture
Students

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中国建筑工业出版社出版、发行(北京西郊百万庄)
各地新华书店、建筑书店经销
北京画中画印刷有限公司印刷

*

开本:889×1194毫米 1/20 印张:11 $\frac{1}{2}$ 字数:334千字
2008年10月第一版 2008年10月第一次印刷

定价:82.00元

ISBN 978-7-112-10396-6

(17320)

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(邮政编码 100037)

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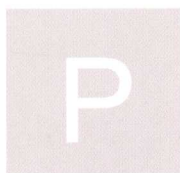
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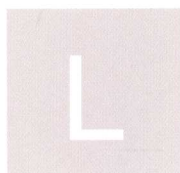
中国建筑工业出版社
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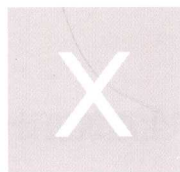
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前言

本书为“数字建构：2008年国际青年建筑师及学生作品展”学生建筑设计作品集。“数字建构”建筑展试图为26所世界一流的建筑学院提供一个展示的窗口，着重展示新数字技术的创新应用。该展览的另一部分为青年建筑师作品展，展出57个极具潜力的建筑师事务所的作品。作为本书的系列，还有青年建筑师作品集。

“数字建构”指在建筑生产过程使用物质或非物质的数字技术进行建筑设计及教学。非物质数字技术包括创造性地使用脚本、编程和参数化模型软件；物质数字技术包括创造性地使用数字建造技术，例如：数控切削、3D打印和激光切割。

这次展览由清华大学建筑学院主办，并作为第三届中国国际建筑艺术双年展的一部分；双年展由罗丽博士领导。展览开幕的同时还将举办由清华大学建筑学院主办、全国建筑院系建筑数字技术教学指导委员会组织的建筑设计及教学研讨会。

主办者感谢国家自然科学基金给予的支持；感谢798时代空间提供展场便利，感谢Autodesk（中国）公司为会议提供赞助。

最后，主办者感谢所有帮助布展和编写本书的人员，在此特别感谢宋刚、劳拉·费拉雷多、李晔国、陈寅、尹志伟、孟姝均、肖燕、姜赛双和魏娜所作出的贡献。

尼尔·林奇
徐卫国

Preface

This catalogue covers the works on display in the '(Im)material Processes: New Digital Techniques for Architecture' exhibition of students work. The intention is to offer a showcase of 26 of the leading schools of architecture in the world, with a particular emphasis on the innovative use of new digital techniques. This work is part of a larger exhibition on the same theme, which includes work from some of the most talented architects in the world.

(Im)material Processes refers to the use of both immaterial and material digital techniques in architectural production. Immaterial digital techniques include the innovative use of scripting, programming and parametric modeling softwares. Material digital techniques on the other hand include the innovative use of digital fabrication technologies such as CNC milling, 3D printing and laser cutting.

This exhibition is organized by Tsinghua University School of Architecture and is taking place as part of the Architecture Biennial Beijing 2008. The opening of the exhibition coincides with a conference on digital design hosted by Tsinghua University School of Architecture and organized by the Architectural Digital Techniques Education Committee of the NSBAE of China.

The organizers are grateful to NSFC of China for their support of the exhibition, to the directors of 798 Space for permitting the exhibition to take place, and to Autodesk (China) for sponsoring the conference.

Finally the organizers are grateful to all who have contributed to staging this exhibition and preparing this catalogue. In particular they would like to thank Song Gang, Laura Ferrarello, Li Yeguo, Chen Yin, Yin Zhiwei, Meng Shujun, Xiao Yan, Jiang Saishuang and Wei Na for their invaluable contribution in helping to design and compile this catalogue.

Neil Leach
Xu Weiguo



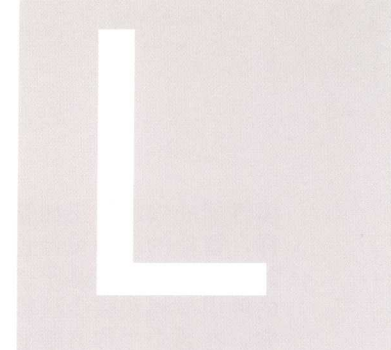
新唯物主义

北京的天际线在最近几个月发生了改变，新的建筑物已经涌现。其中的一些，如OMA设计的中央电视台总部大楼、赫尔佐格和德梅隆设计的“鸟巢”奥林匹克体育场，以及PTW事务所设计的“水立方”奥林匹克水上中心，属于这个世界最惊艳的奇迹。这三个建筑不单为我们的展览提供了一个引人注目的背景，同时也是建筑感性转变的一个证据，这个转变支持了这本书中很多作品的创作。

这表明统治后现代主义建筑文化的旧有体系正让位给新的设计方法。这也许在对结构和装饰的态度上表现最明显。由罗伯特·文丘里、斯科特·布朗和斯蒂文·艾泽诺尔，在他们开创性的著作《向拉斯韦加斯学习》中倡导的对“装饰的外壳”的强调，尽管已影响建筑创作数十年，但最终衰落[1]。我们见证的是一种新的表达：结构已不再是服务于装饰和隐藏在表皮以下，立面也不再被玻璃幕墙的逻辑统治；取而代之的是结构被表现在外并作为一种装饰形式。这并不是说结构凌驾于装饰，而是结构与装饰之间的关系得到了重新定义，结构装饰化，而装饰则结构化。结构和装饰相辅相成。

这背后显然存在一个潜在的结构性能趣味。诸如“性能”这样的时髦词汇已经开始出现，对结构效率的关注在特定的激进建筑师群体的作品中扮演越来越重要的角色，这本书中就有很多这样的例子。同时，历史上一些对结构性能有很准确认识的建筑师，如高迪、奥托和奈维尔，被重新审视并成为评论的焦点。更有甚者，一些像塞西尔·巴尔蒙德那样被德兰达尊称为“材料哲学家”的当代杰出结构工程师，已经成为被人崇拜的偶像。

与对结构性能的兴趣并行的是一个日益增长的对环



New Materialism

The skyline of Beijing has been transformed in recent months. A new generation of buildings has emerged. Some of them – such as the new CCTV headquarters building designed by OMA, the ‘Bird’s Nest’ Olympic stadium by Herzog & de Meuron, and the ‘Water Cube’ Olympic Aquatics Centre by PTW Architects – are among the most startlingly novel to be found anywhere in the world. These three buildings do not only provide a striking backdrop to this exhibition. They also seem to provide evidence of a shift in architectural sensibilities that underpins much of the work in the catalogue.

It as though the old parameters that governed post-modern architectural culture are giving way to a fresh approach to design. This is most evident, perhaps, in attitudes towards structure and ornamentation. The emphasis on the ‘decorated shed’ which Venturi, Scott-Brown and Izenour had championed so much in their seminal book, *Learning from Las Vegas*, and which gripped architectural production for several decades, is – it would seem – finally on the wane.[1] What we are witnessing instead is a new expressivity where structure is no longer subordinated to ornament and hidden beneath the surface, and the façade is no longer dominated by the logic of curtain walling. Instead structure is being expressed on the outside and treated as a form of ornamentation. This is not to say that structure is being privileged over ornament. Rather the relationship between structure and ornamentation is being reconfigured so that structure has become ornamental, and ornament structural. Structure and ornament feed into and inform one another.

Behind this there is clearly an underlying interest in structural performance. Buzz-words such as ‘performativity’ have begun to appear, as concerns for structural efficiency play an ever greater role in the work of a certain group of progressive architects, many of them featured in this catalogue. Meanwhile architects from the past who had an acute awareness of structural performance – figures such as Antonio Gaudi, Frei Otto and Pier Luigi Nervi – have been revisited, and have become the focus of critical re-evaluation. Meanwhile certain leading contemporary structural engineers, such as Cecil Balmond – ‘material philosophers’, as Manuel DeLanda has called them – have begun to assume a certain cult status.

Paralleling this interest in structural performance is an increasing interest in environmental performance. Just as intelligent structures can reduce the amount of materials used, so too intelligent environmental design can reduce the amount of energy consumed. Both interests are ultimately part of the same logic of performativity – the urge to use materials efficiently and minimise waste. As such they cannot be dismissed as the latest fad in an architectural culture all too wrapped up in the latest fashions, but should also be seen to be operating within an ethical dimension in addressing concerns about sustainability.

This concern for performance has led to an increasing interest in materials and their behaviour. This refers both to the use of new materials – such as the ETFE used for pneumatic panels on the ‘Water Cube’ – but also to the intelligent use of more traditional materials – such as the steel structure of the ‘Bird’s Nest’.[2] Para-

境性能的兴趣。正如智能结构可以减少材料量的使用一样,智能的环境设计也可以减少能耗。对结构和对环境的兴趣最终都是基于“性能”的相同逻辑:来自有效率的使用材料和减少垃圾的压力。由此,它们作为时代新宠,在这个“你方唱罢,我登场”的建筑流行文化中不会过时,当然它们也应该在解决“可持续发展”的问题上发挥作用。

对性能的关注激发了人们对材料和其性能的越来越大的兴趣。这既是指要利用新的材料,如“水立方”中使用的聚四氟乙烯,也指对更多的传统材料的智能使用,如“鸟巢”的钢结构[2]。矛盾的是,这个要义常常贯穿在“非物质”化过程中,即通过编程、代码和参数化软件的使用,对材料的物质性能进行探索[3]。

人们不难发现,当代建筑设计发生了一个重大的转变:建筑设计的重心从对建筑纯视觉的关注转向对其性能的评价。结构的、建造的、经济的、环境的以及其他的诸多参数,这些曾经被归为次要因素,如今却日渐显耀,并正被作为积极因素纳入建筑设计过程中。看来,建筑的风格和外观将失守往昔的领地,一个新的范式正在涌现。

这一新的范式可以被理解为击溃后现代主义审美的一个尝试。它试图将建筑设计置于一个比较客观和伦理的框架。在此框架内,对资源的高效使用超过了对作品在后现代主义语境下的审美嗜好。这里提到的后现代主义,不仅包括相对保守的、将应用型装饰图案装饰化使用(正如后现代主义被广泛理解的那样)的流派,也包括像解构主义那样将外观置于性能之上的激进流派。

德勒兹和新的科学思考

建筑理论也体现了类似的转变,在20世纪80~90年代,从结构主义者的逻辑(以查尔斯·詹克斯和罗伯特·文丘里这些建筑作家为代表,启发了早期后现代主义者对符号学的探寻)到后结构主义者对德里达著作意义的探索(这启发了建筑师埃森曼和屈米),建筑理论始终处于文学理论和欧洲大陆哲学的统摄之下。而在21世纪的头十年,学术界对这类理论的兴趣明显消退。

然而这并非支持了建筑理论家迈克尔·斯皮克斯的理论,他声称我们正目睹“理论的死亡”。对于这样的理论,人们可以辩解,这只不过是一个反理论的理论,而在理论之外并无立场。任何形式的建筑实践都被一种理论的冲动所启发,即便是一个藐视理论的实证主义者。甚至我愿宣称,我们所看到的是一个占支配地位的新的理论分支,一个融合了科学、技术和实践的理论。

这个新的理论的主要观点都可以在德勒兹的哲学那里找到根据。如果说还有哪个20世纪的大陆哲学家能够在从对语言学的关注转向对世界的物质理解的智力时尚的变化潮流中幸存,那么这个人一定是德勒兹。他在某些激进的建筑圈子内成为受宠的哲学家,在这个圈子中,图解的概念占有主导地位,对材料性能的探寻成为无上的准则。

德勒兹在其著作中很少提及建筑,但是在他和菲利克斯·加塔里合著的《千座高原》中,有一个很确切的对于建筑设计两个相对应观念的表述[4]。这就好像整个建筑历史结构可分为两个对立、但相互关联的观念:一个是广义的美学观念,试图通过一些预先设定的“模板”,将形式强加到建筑材料上(在这里很容易让人联想到比例和其他视觉秩序的系统);另外一个为广义的结构观念,允许形式根据一定的程序要求“涌现”。

第一种观念被德勒兹和加塔里描述为“罗马式”。这个词似乎有点局限,它的原则广泛涵盖了在“古典主义”旗帜下一系列的风格手法。这不仅包括古典主义本身,如罗马和希腊式变异到罗马风,到文艺复兴式、风格主义、巴洛克和新古典主义;同时包括任何一种关注于外观而非性能的观念。

第二种观念被广泛定义为“哥特式”,这样的设定表明它是一种方法,而非如在19世纪那样被当做一种风格。它是一种过程超越形式的设计方法。形式随着时间的推移而“涌现”,正如哥特式拱顶几个世纪不断优化结构效率,直到建构出精细的扇形拱顶那样。在这种观念下,建筑成为相互竞争力量的结果,是一个引入人类居住冲动并适应冲动的程序化的结构。德勒兹和加塔里认为“哥特式”和“罗马式”观念在本质上就如同将建

doxically, it has often been through 'immaterial' processes – through the use of programming, code and parametric software programmes – that material behaviours have been explored.[3]

Within contemporary architectural design, then, a significant shift in emphasis can be detected – a move away from an architecture based on purely visual concerns towards an architecture justified by its performance. Structural, constructional, economic, environmental and other parameters – concerns that were once relegated to the realm of secondary concerns – have become primary, and are being embraced as positive inputs into the design process from the outset. Architecture – it would seem – is no longer so preoccupied with style and appearance. It is as though a new paradigm has emerged.

This new paradigm can be understood as an attempt to overcome the scenography of postmodernism. It is an attempt to locate architectural discourse within a more objective and ethical framework, where efficient use of resources supercedes the aesthetic indulgences of works that came under the broad heading of postmodernism, which might include not only the somewhat conservative movement noted for its decorative use of applied decorative motifs – as postmodernism is understood most commonly within architectural culture – but also more progressive movements such as deconstructivism, all of which privilege appearance over performance.

Deleuze and New Scientific Thinking

A similar shift can be detected within architectural theory. If during the 1980s and 1990s architectural theory was dominated by an interest in literary theory and continental philosophy – from the structuralist logic that informed the early postmodernist quest for semiological concerns in architectural writers such as Charles Jencks and Robert Venturi to the poststructuralist enqui-

ries into meaning in the work of Jacques Derrida that informed the work of architects such as Peter Eisenman and Bernard Tschumi – the first decade of the 21st century has been characterized by a waning of interest in this branch of theory.

This is not to endorse the position of architectural theorist, Michael Speaks, who claims that we have witnessed the 'death of theory'. For such a theory, it could be argued, is merely an anti-theory theory in that there is surely no position that stands outside theory. Any form of practice must be informed by a theoretical impulse, even if it is a positivistic one that purportedly disdains theory. Rather, I would claim, what we are witnessing is the ascendancy of a new branch of theory, one that engages with science, technology and material behaviour.

Much of this new theoretical work finds its grounding in the thinking of Gilles Deleuze. For if there is one continental philosopher of the 20th century who has survived the shifting sands of intellectual fashion, where the spotlight has moved on from linguistic concerns towards a more material understanding of the world it is Deleuze, who has become the philosopher of choice within certain progressive architectural circles, where the concept of the diagram holds a dominant position, and where questions of material performance have become paramount.

Deleuze makes few explicit references to architecture in his writings, but in *A Thousand Plateaus* – which he co-wrote with Félix Guattari – there is a very precise formulation offered about two alternative sensibilities towards architectural design. [4] It is as though the whole history of architecture can be divided into two contrasting yet reciprocally related outlooks. One would be a broadly aesthetic outlook that tends to impose form on building materials, according to some preordained 'template'. (Here one immediately thinks of the role of proportions and other systems of visual ordering.) The

筑理解为动态，抑或是静态模式那样，差别巨大[5]。

与其说从风格角度去描述这两种不同的观念，还不如说德勒兹和加塔里将其看成为不同的“科学”。一个是内衍的科学，认为世界是由力、流和过程组成[6]。另外一个则是外延的科学，用法则、规律和陈述来理解世界。换言之，一个是光滑的科学，而另外一个则是条纹的。德勒兹和加塔里还将这种对立描述为游牧的、战争机器的科学和皇家的、政府的科学。后者是一个等级系统强加其上的固定的、预设形式的科学[7]。相比之下，游牧的战争机器科学是一种自下而上的模式，对运动中的每个单独的事件作出回应[8]。正是这种“哥特式”精神，被那些深受德勒兹建筑“性能转变”思想影响的当代建筑师所赞美。在德勒兹的思想之外，一个新的“性能”建筑的理论架构已经出现。

新唯物主义

我将这个新理论称做“新唯物主义”，这是一个由曼纽尔·德兰达创造的词语。德兰达自封为“街头哲学家”，在对德勒兹哲学的研究上小有声誉，并且他还在美国东海岸的诸多建筑学校任教，在建筑学思想领域有相当影响。德兰达使用这个词界定了新的理论范式，不但作为以生物学家达西·汤姆森和哲学家亨利·柏格森为源头运动的回溯宣言，而且融合了最新的从各个交叉学科研究中心涌现的科学思想，比如MIT的媒体实验室和圣塔菲研究院，德兰达通过自己的理论著作有效地界定了这一范式。如《千年非线性史》将整个城市发展投射到物质过程的框架中[9]。他的其他著作，如《集中科学和虚拟哲学》继续了这个思路，审视了德勒兹笔下的科学理论[10]。在一个更准确的建筑框架内，德兰达写了一系列文章，借鉴德勒兹的“哥特”精神概念，探索了关于材料特性的相关思想[11]。最近他又在《Do-mus》杂志上发表了一系列关于“新唯物主义”的文章，关注仿生、智能材料和其他当代材料问题。

新唯物主义可以与马克思的旧辩证唯物论对比，从一定意义上说，它依赖于与马克思主义思想相同的基本原理：我们从表面看到的是背后的更深刻过程的结果。但它把这个原则，从一个简单的经济问题扩展到整个文化领域，新唯物主义背后的关键点是承认象征不是这个

时代的主题，而是物质的表达。我们对一个建筑“隐喻”着什么之类的象征关注得越来越少，而越来越多着眼于性能和材料的表现。在德兰达看来，正如我们需要从经济、社会和其他形成城市的政治力量去理解我们的城市一样，我们也需要从物质过程的角度去理解建筑设计概念[12]。

新唯物主义的概念作为一个哲学名词，至今仍未有明确的概念界定。如果一定要定义它的话，最好的办法就是在德兰达的著作中找寻与之相关的间接阐述。在建筑圈子内，除了德兰达，很少有人使用这个词。不过很显然，它将对激进的设计圈子内的一系列探索加以理论概括。这些探索，既包括如Manferdini工作室、Matsys、伊东丰雄事务所、OMA、LAVA、OCEAN和Material Ecology这样激进的设计事务所的作品，也包括虽然没有使用“新唯物主义”这个名词，但涉及这个主题的大量有影响的著作[13]。对“新唯物主义”的兴趣还在创新的结构工程师那里与日俱增，如塞西尔·巴尔蒙德、哈尼夫·卡拉和佐佐木睦朗。另外，数字建造技术，如数控机床、激光切割、3D打印，在全球的建筑教育中正发挥着越来越重要的作用，特别是在英国的AA、瑞士的苏黎世高工和美国的哈佛大学设计学院。同时，这还反映在对启发设计的非物质过程——如脚本、编程和参数化建模等——日益增长的关注。

新唯物主义这个名词可以用来形容这些新的工作，他们是对后现代主义透视画法的反思。我们应认识到，这些建筑师和“非标准”的后现代主义建筑师的作品会存在某种外表的相似，不过，只是相似而已。在“后现代”设计探索中，建筑师被视为天才的创造者，对这个世界施以一个自上而下的形式，而结构工程师的角色则是将这些大师的设计予以实现，尽可能接近他/她的最初的诗意表达。而更多当代“新唯物主义”的建筑师在新的形式范式下工作，他们是过程的控制者，推进自下而上的生成性结构形式的涌现。

两者的差异在于，后者“找形”，而非“造形”；自下而上，而非自上而下；“形成”，而非“形式”。“形式”这个词汇本身就应该归入“形成”的辅助地位。同时“形成”必须与“信息”和“性能”关联，当建筑关注于性能，那么它将较少考虑形式，更多

other would be a broadly structural outlook that tends to allow forms to 'emerge' according to certain programmatic requirements.

The first sensibility is described by Deleuze and Guattari as the 'Romanesque'. The term seems somewhat restrictive, in that the principle covers a range of stylistic approaches which broadly come under the umbrella of the Classical. This would include not only the Classical as such — the Roman and Greek styles which mutated through the Romanesque, into the Renaissance, Mannerism, Baroque, and Neo-Classical — but also any outlook which focuses on appearance rather than performance.

The second could be broadly defined as the Gothic, which is configured not as a style, as it was in the nineteenth century, but as a method. It is a way of designing that privileges process over appearance. Form 'emerges' with time, much as the Gothic vault evolved over the centuries, becoming ever more refined in its structural efficiency, until it reached such intricacies as fan vaulting. Within this outlook architecture becomes the result of competing forces, a programmatic architecture that registers the impulses of human habitation, and adapts to those impulses. Deleuze and Guattari analyze the distinction between the Gothic spirit and the Romanesque as a 'qualitative' distinction, between a static and a dynamic model of understanding architecture.[5]

Rather than describing these two different outlooks in terms of style, Deleuze and Guattari refer to them in terms of different 'sciences'. One is a science of intensive thinking that perceives the world in terms of forces, flows, and process. [6]The other is a science of extensive thinking that seeks to understand the world in terms of laws, fixity and representation. In other words, the one is a smooth science, and the other striated. Deleuze and Guattari also describe this opposition as being that between a nomad, war-machine science and a royal, state science. The latter is a science of fixed ru-

les and given forms, a hierarchical system imposed from above.[7] By contrast, the nomad war-machine science is a bottom-up model that responds in each individual instance to the particularities of the moment. [8] It is this Gothic spirit that is seemingly celebrated by certain contemporary architects working under the aegis of Deleuze's thinking in this 'performative turn' within architectural culture. Out of Deleuze's thinking a new 'performative' theory of architecture has emerged.

New Materialism

I will call this new theory, 'New Materialism', a term coined by Manuel DeLanda, a self-styled 'street philosopher' who has developed a certain reputation for his interpretation of the work of Deleuze, and who has had a major impact on architectural thinking through various teaching positions he has held in architectural schools in East Coast America. DeLanda uses this term to define a new theoretical paradigm, which operates as a retrospective manifesto for a movement whose genealogy stretches back to the work of biologist D'Arcy Wentworth Thompson, philosopher, Henri Bergson, and beyond, but also incorporates much recent scientific thinking that has emerged from centres of interdisciplinary scientific research, such as the MIT Media Lab and the Santa Fe Institute. DeLanda has effectively identified this new paradigm through his own theoretical writings. Books such as *A Thousand Years of Nonlinear History* recast the whole history of urban growth within a framework of material processes. [9] He has followed this up with other books, such as *Intensive Science and Virtual Philosophy*, which examines the role of scientific theory in Deleuze's writing.[10] Within a more precisely architectural framework, DeLanda has written a series of articles drawing upon Deleuze's notion of the 'Gothic' spirit, and exploring its relevance for thinking in terms of material behaviour. [11]Most recently he has published a series of articles on New Materialism in *Domus*, looking at biomimetics, intelligent materials and other contemporary material concerns.

关注于材料形式“形成”的论述，也就是说，“形式”必须被性能原则所启发，而遵循材料形式“形成”的逻辑。

换句话说，新唯物主义的逻辑以一种普遍的形式出现，不但启发着新兴一代的建筑师和建筑系学生（他们的作品在这个展览中出现），也催生出如鸟巢、水立方和中央电视台总部这样一批为这个展览提供了如此激动人心的舞台背景的北京新建筑。在建筑学的探索中，新的范式已经存在，这本书正试图捕捉到它。

尼尔·林奇

New Materialism can be contrasted with the old dialectical materialism of Karl Marx. In some sense it relies on the same basic principle of Marxist thinking – that what we see on the surface is the product of deeper underlying processes. But it extends this principle from a simple economic arena into the whole of culture. The key behind New Materialism is to recognise that the emphasis today is not on symbols but on material expressions. We are concerned less and less with symbolic content – what a building might ‘mean’ – and more and more with performance and material behaviours. Just as – in DeLanda’s terms – we need to understand our cities in terms of the economic, social and political forces that generate them, so too we need to understand architectural design in terms of material processes.[12]

New Materialism has yet to be defined in concrete terms even as a philosophical concept. Indeed if we are to look for a definition of the term, the best we could do is to see it articulated indirectly through DeLanda’s own writings. Within architectural culture, the term has been used even less often, and only by DeLanda himself. Nonetheless it is clear that it serves to draw together and make explicit a series of concerns expressed in progressive design circles, both through the works of progressive architectural practices, such as Atelier Manferdini, Matsys, Toyo Ito and Associates, OMA, LAVA, OCEAN and Material Ecology, and through the publication of various influential volumes which engage with the central themes of New Materialism, without using the term itself.[13] It is reflected too in an increasing interest in innovative structural engineers, such as Cecil Balmond, Hanif Kara and Mutsuro Sasaki, and digital fabrication processes, such as CNC milling, laser cutting, 3D printing, which are playing an increasingly important role in architectural education throughout the world, especially in schools such as the Architectural Association, ETH Zurich and Harvard GSD. And it is reflected too in the increased interest in immaterial processes, such as scripting, programming and parametric modelling, that inform the design itself.

As such New Materialism could be used as a term to describe this new body of work – a body of work that offers a powerful riposte to the scenographical emphasis of postmodernism. For what we need to recognise is that there might be an apparent formal similarity between the work of these architects and ‘non-standard’ postmodern architects. But that is where the similarity ends. In the ‘postmodern’ approach towards design, the architect is perceived as the genius creator who imposes form on the world in a top-down process, and the primary role of the structural engineer is to make possible the fabrication of the designs of the master-architect, as close as possible to his/her initial poetic expression. Meanwhile the more contemporary ‘New Materialist’ architects operating within the new morphogenetic paradigm have become the controllers of processes, facilitating the emergence of bottom-up form-finding processes that generate structural formations.

The difference, then, lies in the emphasis on form-finding over form-making, on bottom-up over top-down processes, and on formation rather than form. Indeed the term ‘form’ itself should be relegated to a subsidiary position to the term ‘formation’. Meanwhile ‘formation’ must be recognized as being linked to the terms, ‘information’ and ‘performance’. When architecture is ‘informed’ by performative considerations it becomes less a consideration of form in and of itself, and more a discourse of material formations. In other words, ‘form’ must be ‘informed’ by considerations of ‘performative’ principles to subscribe to a logic of material ‘formation’.

The logic of New Materialism, in other words, is now appearing as a pervasive logic that is informing not only the work both of an emerging generation of students and architects whose work is included in this exhibition, but also the Bird’s Nest, Water Cube and CCTV headquarters, the new buildings in Beijing that provide such a striking backdrop to the exhibition. There is a new paradigm in architectural production, and this catalo-

注:

[1] 罗伯特·文丘里, 丹尼斯·斯科特·布朗, 斯蒂文·艾泽诺尔著. 向拉斯韦加斯学习. 剑桥: 麻省理工学院出版社, 1972:87

[2] 聚四氟乙烯是一种高分子材料, 在慕尼黑的ALLIANZ体育场和英国的伊甸园工程中使用。

[3] 尼尔·林奇, 戴维·特恩布尔, 克莱斯·威廉姆斯著. 数字建构学. 伦敦: 威利出版公司, 2003:4

[4] 吉尔·德勒兹, 菲利克斯·加塔里著. 千座高原: 资本主义和精神分裂症. 布赖恩·马苏米译. 伦敦: 阿斯隆出版社, 1988

[5] 与哥特式建筑密不可分的一大意念就是建造比罗马风教堂更久、更高、更大的教堂。这一差异并非简单的量化, 它体现在定性层面的变化: 从静态的、形式与物质的关系到动态的、材料与力的关系。正是对石料的加工使得材料能够适应和组合侧推力, 从而使得能够建造更高和更长的拱顶。拱顶不再是一种形式, 而是石料的连续变化。所以哥特式是光滑的空间, 而罗马式则仍然是条纹空间 (其中的拱顶是依靠并排的柱子的支撑)。

[6] 没有再现, 只有产生和超越。这个科学并没太多数学公式, 而是将其切实应用作为特征: 并非成为好的形式绝对地组织物质, 而是在一个定性优化演算下, 由材料所“生成”的“侧推力”。

[7] 皇家的/政府的科学仅能忍受在强调固定的形式模型、数学数字和测量优先权下按照一定的模板加工素材。

[8] 进一步区分这两种操作模式的方法是引入德勒兹和加塔里定义的“少数科学”和“主要科学”的概念: 折线的倾向是成为一条曲线, 正如程序的科学 (作为关于性状和运动的操作性几何学) 以一种不同于欧几里德的皇家的或主要的科学的方式运作, 甚至还被长久的质疑和压制。

[9] 曼纽尔·德兰达著. 千年非线性史. 纽约: ZONEBOOKS/SWERVE出版公司, 1997

[10] 曼纽尔·德兰达著. 集中的科学和虚拟哲学. 伦敦和纽约: “连续统一体”出版公司, 2002

[11] 参见尼尔·林奇, 戴维·特恩布尔, 克莱斯·威廉姆斯著. 数字建构学. 伦敦: 威利出版公司, 2004

[12] 例如, 如果我们要寻找对于这种新方法的设计过程的描述, 我们可以看看在某些山沟的河床的石块, 那些石块不是上帝收集和排布的 (尽管可能他/她花了一下午在那里劳作, 将石块按照某种方式排布), 而是通过自然的力量。每一个石头的位置被其形状、重量和融化后将其冲到那里的雪水的力量所决定。

[13] 参见迈克尔·汉塞尔, 阿齐姆·蒙吉斯, 迈克尔·温斯托克著. 涌现: 形态发生设计策略. 伦敦: 威利出版公司, 2004. 7; 迈克尔·汉塞尔, 阿齐姆·蒙吉斯, 迈克尔·温斯托克著. 形态发生设计技巧和技术. 伦敦: 威利出版公司, 2006. 3

gue is trying to capture that paradigm.

Neil Leach

References:

- [1] Robert Venturi, Denise Scott Brown and Steven Izenour, *Learning from Las Vegas*, Cambridge: MIT Press, 1972, p. 87.
- [2] Ethylene tetrafluoroethylene is a fluorocarbon based polymer which has also been used on the Allianz Arena in Munich, Germany, and the Eden Project in Cornwall, England.
- [3] On this see Neil Leach, David Turnbull and Chris Williams (eds.), *Digital Tectonics*, London: Wiley, 2004.
- [4] Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi, London: Athlone, 1988.
- [5] 'Gothic architecture is indeed inseparable from a will to build churches longer and taller than the Romanesque churches. Ever further, ever higher. . . But this difference is not simply quantitative; it marks a qualitative change: the static relation, form-matter, tends to fade into the background in favor of a dynamic relation, material-forces. It is the cutting of stone that turns it into materialcapable of holding and coordinating forces of thrust, and of constructing ever higher and longer vaults. The vault is no longer a form but the line of continuous variation of the stones. It is as if Gothic conquered a smooth space, while Romanesque remained partially within a striated space (in which the vault depends on the juxtaposition of parallel pillars).' Deleuze and Guattari, *A Thousand Plateaus*, p. 364.
- [6] 'One does not represent, one engenders and traverses. This science is characterized less by the absence of equations than by the very different role they play: instead of being good forms absolutely that organize matter, they are "generated" as "forces of thrust" (poussées) by the material, in a qualitative calculus of the optimum.' Deleuze and Guattari, *A Thousand Plateaus*, p. 364.
- [7] 'Royal, or State, science only tolerates and appropriates stone cutting by means of templates (the opposite of squaring), under conditions that restore the primacy of the fixed model of form, mathematical figures, and measurement.' Deleuze and Guattari, *A Thousand Plateaus*, p. 365.
- [8] A further way to distinguish these two models of operation is the distinction Deleuze and Guattari make between 'minor' and 'major' sciences: 'the tendency of the broken line to become a curve, a whole operative geometry of the trait and movement, as pragmatic science of placings-in-variation that operates in a different manner than the royal or major science of Euclid's invariants and travels a long history of suspicion and even repression.' Deleuze and Guattari, *A Thousand Plateaus*, p. 109.
- [9] Manuel DeLanda, *A Thousand Years of Nonlinear History*, New York: Zone Books/Swerve Editions, 1997.
- [10] Manuel DeLanda, *Intensive Science and Virtual Philosophy*, London and New York: Continuum, 2002.
- [11] See, for example, DeLanda 'Material Complexity' in Neil Leach, David Turnbull and Chris Williams (eds.), *Digital Tectonics*, London: Wiley, 2004.
- [12] If, for example, we were to look for an illustration of this new approach in terms of design processes, we might look to the example of stones on a riverbed in some mountain valley. It is not as though the stones collected there were arranged by God – as if s/he had spent an afternoon gardening there and had arranged the stones in a certain way – but by the forces of nature itself. The position of each stone is defined by its shape, weight and the forces that washed it there after the melting snows create a torrent of water that swept down the mountain.
- [13] See, for example, Michael Hensel, Achim Menges, Michael Weinstock (eds.), *Emergence: Morphogenetic Design Strategies*, London: Wiley, July 2004; Michael Hensel, Achim Menges, Michael Weinstock (eds.), *Techniques and Technologies in Morphogenetic Design*, London: Wiley, March 2006.