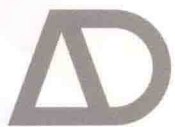


PARAMETRICISM 2.0



RETHINKING
ARCHITECTURE'S
AGENDA FOR THE
21ST CENTURY

Guest-Edited by
PATRIK SCHUMACHER



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PATRIK SCHUMACHER



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21ST CENTURY

PARAMETRICISM 2.0



ARCHITECTURAL DESIGN
March/April 2016



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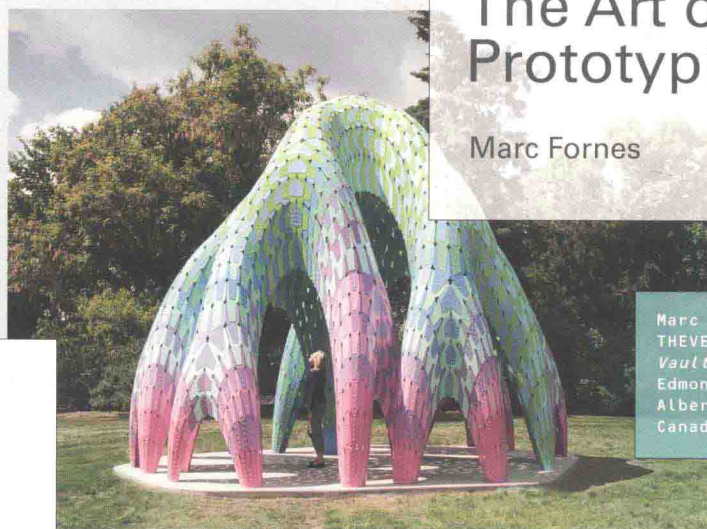
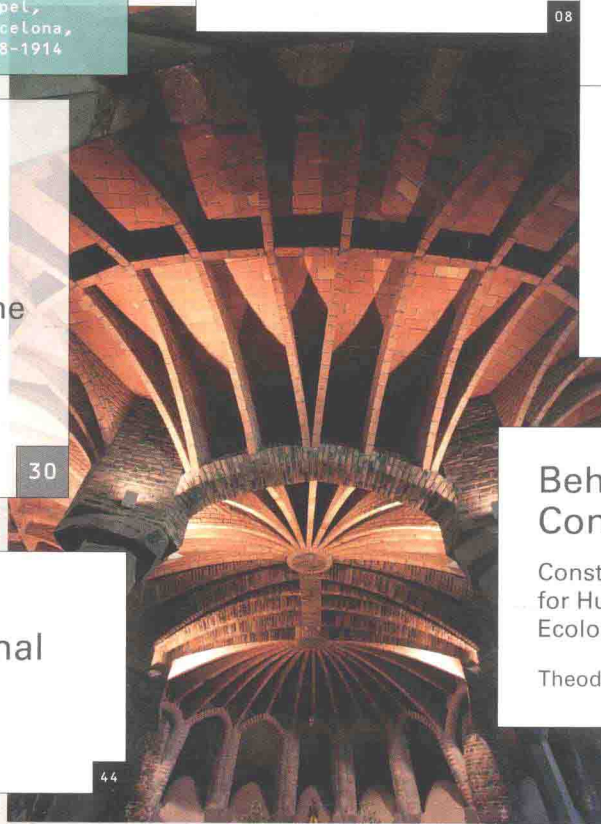
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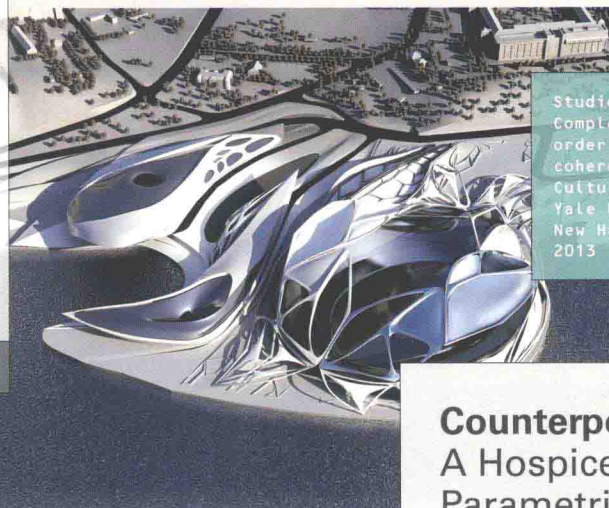
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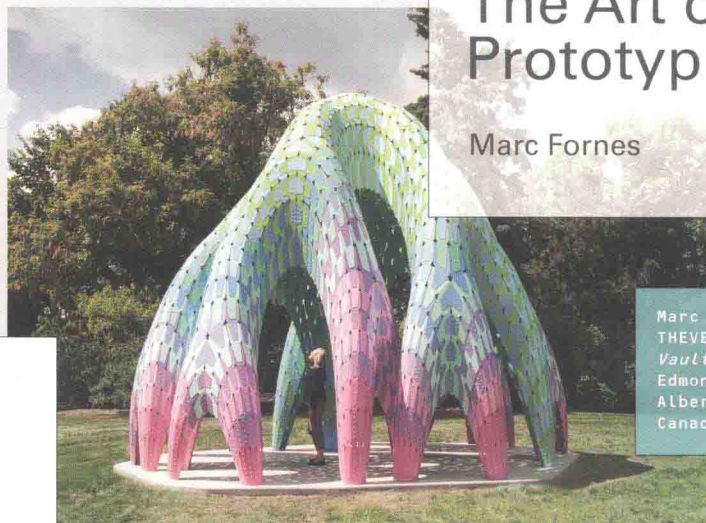
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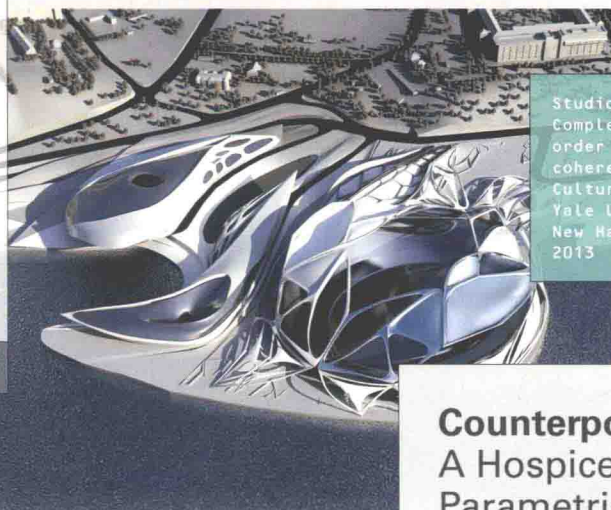
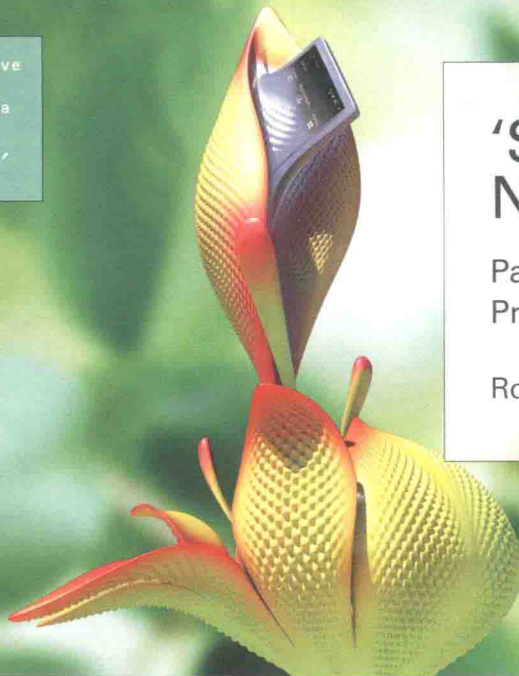
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Beijing, China, 2012.
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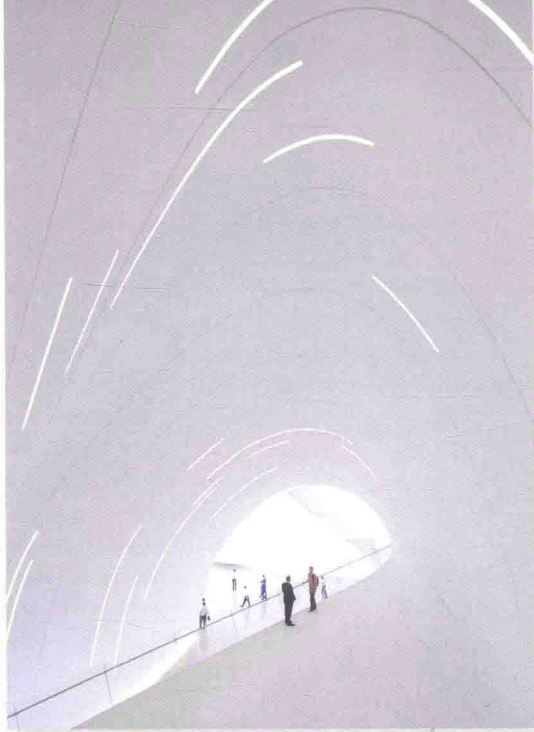
EDITORIAL

HELEN CASTLE

Parametricism by its very formulation is controversial. As a term, 'Parametricism' is an inflation of the concept of 'parametric design': the design process that employs variable parameters or algorithms to generate geometries or objects. While parametric design is a matter of methodology and aesthetically agnostic, with the addition of that crucial 'ism' Parametricism takes on all the stylistic and social intentionality of a movement. In an age of pluralism, Parametricism's assertive confidence sets it apart within the architectural community, igniting dissent. (See Mark Burry's description of the architectural 'kerfuffle' it has stirred up on p 32 and Mark Foster Gage's scathing Counterpoint on p 128.) Parametricism is uncompromising and unapologetic in its bid for centre stage. Rather than seeking to accommodate a multitude of simultaneous tendencies or trends, it assuredly aspires to be *the* single universal, global style in a manner that is redolent of Modernism. Like the Modern Movement, it draws its charge and impetus from technological advancement, as described by Guest-editor Patrik Schumacher in the Introduction: 'Parametricism is architecture's answer to contemporary, computationally empowered civilisation, and is the only architectural style that can take full advantage of the computational revolution that now drives all domains of society.' Unlike other architects, who are diffident to the point of being evasive about the formal qualities of their architecture, Schumacher unambiguously advocates Parametricism as a style.

Over the last eight years, Parametricism's ascendancy as a force to be reckoned with in architecture is almost solely due to the output and activities of its main protagonist Patrik Schumacher, Partner at Zaha Hadid Architects (ZHA) and founder/studio master at the Architectural Association's Design Research Lab (AADRL). Zaha's work, as demonstrated by buildings such as the MAXXI: Italian National Museum of 21st Century Arts in Rome (2009), the Guangzhou Opera House in China (2010), the London Aquatics Centre for the 2012 Olympic Games (2011) and the Heydar Aliyev Centre in Baku (2013), has created some of the most memorable and iconic buildings of our time. Schumacher has been unafraid to take the platform, raise his head above the parapet and unstintingly assert his position and cause debate. This is often in a climate when Zaha's very success has exposed the practice and Parametricism to sniping criticism from other architects and the media. This issue of Δ comes at a time when Schumacher recognises that the tide of fashion is turning and Parametricism is 'externally embattled', losing its sway in leading architectural schools around the world. Through its redefinition of Parametricism, *Parametricism 2.0* embraces this as a moment of questioning through 'self-critical redirection'. This is reflected in the issue by the fact that rather than filling the contents with his own coterie, Schumacher consciously extended the invitation to contribute to renowned thinkers and architects such as John Frazer, Mark Burry and Achim Menges, who might generally be regarded as being comfortably outside Parametricism's fold.

Whatever your response to Parametricism as a formal style, it is apparent that Schumacher's espousal of it as a movement has had a positive impact on contemporary architecture: provoking debate and causing architects with disparate approaches to react and redefine their own positions in riposte. It has also motivated an entire generation of students and emerging architects to skill up and explore advanced computational design techniques. Moreover, as an architecture of the utmost confidence, Parametricism goes out into the world and asserts itself through exciting buildings, enhancing the credence, presence and interest of architectural culture and design among the wider public. Δ



Zaha Hadid Architects (ZHA)

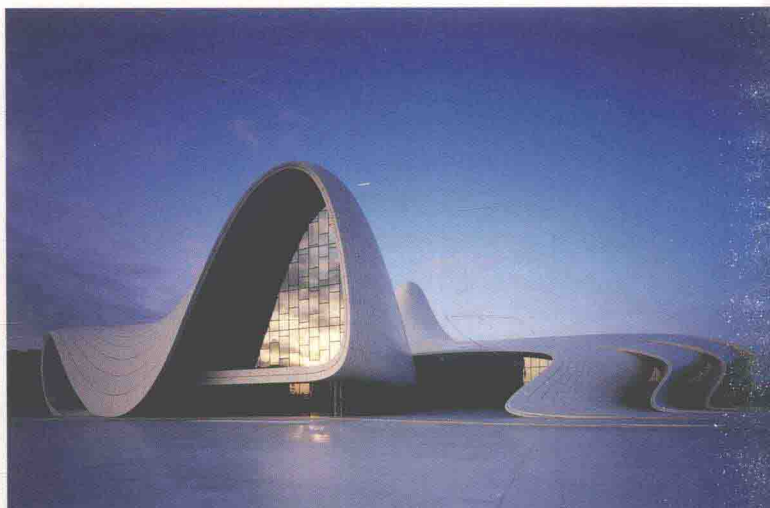
Heydar Aliyev Centre

Baku

Azerbaijan

2012

This national cultural centre comprises a museum, library and concert hall. The design fuses yet also distinguishes the three institutions within its continuous silhouette and surface. The unity-across-differences principle also connects and differentiates the interior spaces.



ABOUT THE
GUEST-EDITOR

PATRIK SCHUMACHER

Patrik Schumacher is partner at Zaha Hadid Architects (ZHA) and co-founder of the Architectural Association Design Research Lab (AADRL) in London. He joined Zaha Hadid in 1988 and has since been co-author of many key projects such as the MAXXI: Museum of XXI Century Arts in Rome (2009), Heydar Aliyev Culture Centre in Baku, Azerbaijan (2012) and Dongdaemun Design Plaza in Seoul (2013). He has been seminal in developing ZHA to become a 450-strong global architecture and design brand.

Schumacher studied philosophy, mathematics and architecture in Bonn, London and Stuttgart, where he received his Diploma in architecture in 1990. In 1999 he completed his PhD at the Institute for Cultural Science, Klagenfurt University. He continues to teach in the AADRL programme, and from 2004 to 2013 was Professor at the Institute for Experimental Architecture at the University of Innsbruck. In 2013 he was appointed as the first John Portman Chair in Architecture at Harvard University's Graduate School of Design (GSD).

In his much-debated Δ article 'Parametricism: A New Global Style for Architecture and Urban Design' (2009),¹ Schumacher argued that the global convergence in recent avant-garde architecture justifies the enunciation of a new style – Parametricism – poised to succeed Modernism as a new epochal style for the 21st century. He believes Parametricism is architecture's answer to the momentous technological and socioeconomic transformation of world society brought about by the Information Age. In 2011 he published his treatise *The Autopoiesis of Architecture, Vol.1: A New Framework for Architecture*.² The book presents a comprehensive discourse analysis of the discipline, analysing architecture's key distinctions, concepts, values, styles, methods and media. Its central thesis is that the phenomenon of architecture can be most adequately grasped if it is analysed as an autonomous network (autopoietic system) of communications.

The second volume of the treatise – *Vol. 2: A New Agenda for Architecture* – was published in 2012.³ Here Schumacher proposed a new agenda for contemporary architecture in response to the challenges and opportunities posed by current societal and technological developments. The volume ends with an expanded manifesto for the new epochal style of Parametricism. To be credible, Schumacher argues, a unified style must be backed up and guided by a unified theoretical system that is able to integrate many partial theories: a theory of architecture's societal function, of the discipline's self-demarkation, and of the avant-garde, aesthetic theory, media theory, process theory etc. He asserts that the theory of architectural autopoiesis presents such an integrated theoretical system as the rational reconstruction and systematisation of the discursively evolving discipline, made explicit as unified theory and opened up to criticism and constructive elaboration.

Since the publication of his magnum opus, Schumacher has expanded his research in two related directions, namely the elaboration of a new approach to architectural semiology based on crowd simulation and the investigation of how a legible urban order might emerge on the basis of market processes under the auspices of Parametricism as a global best-practice methodology. Δ

Notes

1. Patrik Schumacher, 'Parametricism: A New Global Style for Architecture and Urban Design', in Neil Leach (ed), *AD Digital Cities*, July/August (no 4), 2009.
2. Patrik Schumacher, *The Autopoiesis of Architecture, Vol I: A New Framework for Architecture*, John Wiley & Sons (Chichester), 2011.
3. Patrik Schumacher, *The Autopoiesis of Architecture, Vol II: A New Agenda for Architecture*, John Wiley & Sons (Chichester), 2012.

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INTRODUCTION

PATRIK SCHUMACHER

SOM

Terminal 2

Chhatrapati Shivaji
International Airport

Mumbai

India

2014



Gearing Up to Impact the Global Built Environment

Parametricism 2.0

Since launching 'Parametricism' at the 2008 Venice Architecture Biennale and further consolidating its inception with an article in Δ in 2009, the term has gained a wide and established currency within architectural discourse.¹ Its meaning is presupposed here and can be gleaned from the well-written respective Wikipedia entry.² But what is the point and meaning of 'Parametricism 2.0'?

Parametricism is evolving internally yet is externally embattled. Its internal evolution needs to accelerate, as well as address and confront its external critics. The aim of this issue of Δ is to try to halt and reverse the increasing marginalisation of Parametricism, the evidence for which is apparent in its fading influence within schools of architecture. This turn away from Parametricism is most conspicuous within the former hotbeds of the movement such as the Architectural Association (AA) in London and Columbia University Graduate School of Architecture, Planning and Preservation (GSAPP) in New York. Another indication is the general backlash against 'iconic' architecture in architectural criticism, and the recent proliferation of a frugal Neo-Rationalism. The anti-icon polemic misunderstands that an architecture that is rigorously developed on the basis of radically new, innovative principles becomes conspicuous by default rather than by intention. Both the anti-icon and Neo-Rationalist camps fail to recognise that the new societal complexity calls for urban and architectural complexity.

Within this increasingly hostile environment, Δ is not only Parametricism's most important communication platform, but indeed its last high-powered bastion where it maintains a strong (if not dominant) presence. Its many dedicated issues have been Parametricism's organs for theoretical debate and project exposition. Two recent issues of particular pertinence to the new emphasis that Parametricism 2.0 aims to promote within the movement are Δ *Computation Works* (2013)³ and Δ *Empathic Space* (2014).⁴ The first demonstrates the emphasis on research-based best-practice expertise that can deliver large, important buildings; and the second the new focus on social functionality. Both aspects are crucial for Parametricism to mature from an avant-garde and research-focused movement to the mainstream best practice and global style it deserves to become. If the current backlash against Parametricism succeeds in halting its proliferation and preventing its transformative impact, then the

discipline is failing in its *raison d'être* to innovatively adapt and upgrade the built environment in response to the challenges and opportunities of contemporary civilisation. If retro-rationalism prevails, then the discipline of architecture will once again end up where it was 80 years ago, without any impact on the built environment and with no contribution to society whatsoever.

The embattled state of Parametricism calls for a high-stakes discourse based on: (1) confrontation – a no-holds-barred polemic and criticism of its detractors and supposed alternatives; (2) explication – a positive explanation of its superior rationality that makes explicit its compelling advantages and achievements; and (3) self-criticism: a critical debate within the movement that not only takes to task the superficial epigones that serve to discredit it, but self-critically and constructively debates its most urgent challenges and research agendas. This issue of Δ is dedicated to the challenges related to the second and third points above, leaving the equally urgent polemical confrontation to better-suited media.

The Crisis of Parametricism and the Agenda of Parametricism 2.0

In order to reverse the current marginalisation of Parametricism, it is necessary to relaunch it in a self-critical redirection as Parametricism 2.0. Parametricism is architecture's answer to contemporary, computationally empowered civilisation, and is the only architectural style that can take full advantage of the computational revolution that now drives all domains of society. More specifically, it is the only style congenial to recent advances in structural and environmental engineering based on computational analytics and optimisation techniques. All other approaches are incapable of working with the efficiencies of the adaptive structural and tectonic differentiations that issue from new engineering intelligence, forcing its adherents to waste this opportunity and thus to squander resources.

Taking the above performance conditions seriously almost inevitably leads contemporary architects to Parametricism and the geometric transcoding of parameter variations into differentiated geometries. This much pertains to Parametricism's obvious superiority in terms of the technical functionality of the built environment. But what is perhaps less obvious, though by no means less compelling, is its superiority with respect to the advancement of the social functionality of the built environment. Due to its versatile formal and spatio-organisational repertoire, Parametricism is the only contemporary approach that can adequately address the challenges posed to architecture by the new social dynamics of the Information Age. Accordingly, it is already addressing all major urban building tasks, on all scales, including infrastructure projects such as railway stations and airports.

These facts, though, are only rarely appreciated. The functionality of Parametricism – whether technical or social – is usually seen as suspect. Indeed, Parametricist works are not even presumed to aim at performance, and instead are misunderstood as expressions of artistic or technophilic exuberance, or even as esoteric design process fetishism. This is unfortunate, but perhaps excusable, since the functioning of many projects remains indeed suspect, and the discourse of the parametric design movement has not placed enough emphasis on discussion and explication of its practical advantages, especially in the domain of social functionality. While artistic and technological creativity, as well as esoteric internal design process orientation, must still play a part in creating the avant-garde character of Parametricism, this must now recede and give way to a focus on social performance if the movement is to mature, go mainstream and be accepted as a serious contender for global best practice.

Zaha Hadid Architects

Beijing New Airport
Terminal Building

Beijing

China

due for completion
2019

Studio Fuksas

Terminal 3

Shenzhen Bao'an
International Airport

Guangdong

China

2013

top, previous spread and bottom:
Parametricism conquers mainstream
building tasks including large-scale,
high-performance infrastructure
projects like airports. The advantages
of versatile curvilinearity as a means
of maintaining legibility in the face of
complexity come to the fore in these
recent airport designs.



Parametricism is architecture's answer
to contemporary, computationally
empowered civilisation ...



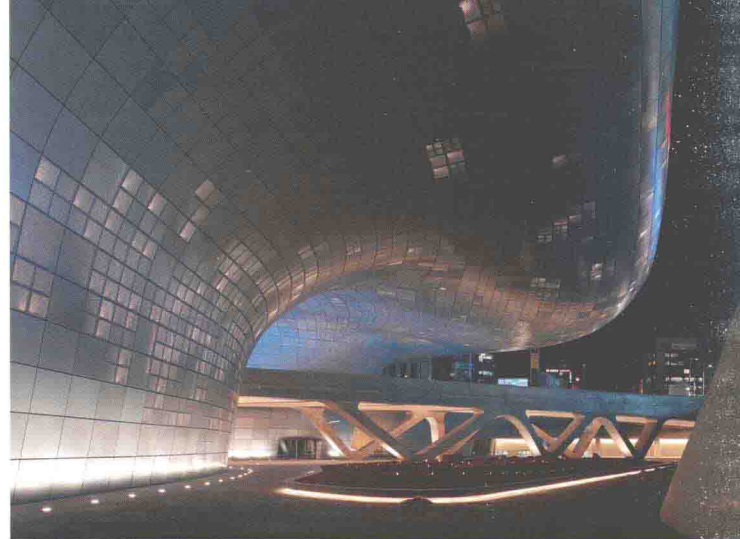
However, the 2008 economic crisis and subsequent great recession have slowed down Parametricism's expansion into the mainstream. Moreover, over the last few years of economic stagnation, when investment in spatial and formal complexity was regarded as an indefensible self-indulgence in the face of general austerity, the misleading assessment of the Parametricist movement turned into outright hostility. Parametricism – associated as it is with the profligacy of the boom years – is thus experiencing a crisis of legitimacy. In order to survive and succeed, it must shift its focus away from the foregrounding of formal principles and design processes, and instead place more emphasis on functional principles and societal purposes. Design research should continue, but must become more strategic, applied and performance oriented. This has already started to happen. Parametricism is thus growing up and becoming serious about making an impact in the world.

This issue of Δ gathers together some of the key protagonists of Parametricism and presents important, computationally informed design research in architecture, urbanism and product design, as well as closely related experimental research in structural engineering, fabrication and the application of robotics within the domain of the built environment. As Philippe Block puts it in his contribution to this issue: 'Parametricism needs real structural and engineering innovations to differentiate itself from purely image-driven architecture and to realise the full potential of complex curved geometry' (see pp 68–75). His design research with the Block Research Group (BRG) at ETH Zurich makes the efficiencies of shell structures available for the generation of new and complex freeform shapes, considerably expanding the problem-solving capacity of these super-efficient structural systems. The result, in Block's words, is that 'the terms "expressive" and "structurally efficient" are no longer oxymoronic, but can be synonymous'.

All of the work presented in this Δ shows that the days of adolescent muscle-flexing are over, that the real work has begun, in terms of serious research and realised projects that excel in technical as well as social functionality, and that Parametricism can now take on relevant, high-performance projects.

The issue begins with reflections on the historical precursors and recent history of Parametricism as a backdrop for its current achievements and a guide map for its future trajectory. John Frazer's 'Parametric Computation: History and Future' (pp 18–23) describes the history of computation within architecture/design, emphasising the far-sighted vision of the pioneers of the 1960s and 1970s that was lost with the commercial uptake of computer-aided design (CAD) as a mechanical drafting tool in the 1980s, and then rediscovered in the generative systems of the late 1990s. Parametricism is now espousing the values that inspired and motivated these pioneers.

Mario Carpo's short history of Parametricism – 'Parametric Notations: The Birth of the Non-Standard' (pp 24–9) – then makes the point that it was the exuberant formalists such as Frank Gehry, Peter Eisenman, Zaha Hadid and Wolf Prix who were the first to make computation impactful within architecture in the early 1990s, while the more serious



Zaha Hadid Architects

Dongdaemun Design Plaza

Seoul

South Korea

2013

The organisation of the project includes three permanent museums, a library, several large exhibition halls and workshop spaces. It provides a national hub for popular education as well as elite communication for the creative arts, for example as host to Seoul Fashion Week. The building sponsors an urban park and gives shape and orientation to a complex inner-city site, providing intuitive access from multiple levels and directions.



cybernetic experiments of the 1960s and 1970s – and the pioneers Frazer celebrates – in Carpo's words 'did not change architecture at all'. Carpo emphasises that architects have been at the forefront of technological innovation and expressed the logic and opportunities of digital tools better than most other professions.

However, a generalisable real-world impact can only be expected when the playfully discovered opportunities are systematically applied by yet another cast of characters: the protagonists/authors of this issue. The current protagonists of Parametricism have been deeply impressed and influenced by the profoundly innovative work of Antoni Gaudí and Frei Otto, who must be recognised as its predigital precursors. According to Mark Burry, the

parametric work of Gaudí and Otto is countering any claim that Parametricism is merely a contemporary digital condition (see his article on pp 30–35). (This point is further supported by Frazer's reminder about Luigi Moretti's 'Architettura Parametrica', as well as by Carpo's suggestion that the procedural geometrical rules of Gothic building can be understood as parametric algorithms.) Recognition of these precursors is coherent with my own insistence on the independence and distinction of Parametricism as a paradigm, methodology and style from the use of digital tools per se. However, computational empowerment and coding has become increasingly important for the current and future ambitions of Parametricism 2.0.