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Book Review: Nexus: Architecture and Mathematics, edited by Kim Williams

Joseph Malkevitch
City University of New York, York College

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Book Review: *Nexus: Architecture and Mathematics*, Kim Williams, ed.

Joseph Malkevitch
Department of Mathematics and Computing, York College (CUNY)
Jamaica, New York 11451
email: joeyc@cunyvm.cuny.edu

Nexus: Architecture and Mathematics. Kim Williams, ed. Edizioni Dell'Erba via Castruccio 1-50054 Fucecchio (Firenze), Italy, 1996. PHONE AND FAX (0571) 242093. ISBN 88-86888-04-X.

One way to judge the success of the mathematics curriculum in grades K-12 is to see if it results in large enough numbers of successful practitioners of mathematics (and in a broader sense scientists and engineers), if it creates a climate in which mathematics is appreciated and valued for its own sake and for its role in development of applications and new technologies, and if it delivers high school graduates who have basic skills as problem solvers and are flexible thinkers. There is much evidence that the high school mathematics curriculum of the past has failed on the last two points. Some might argue it has failed to meet all these tests.

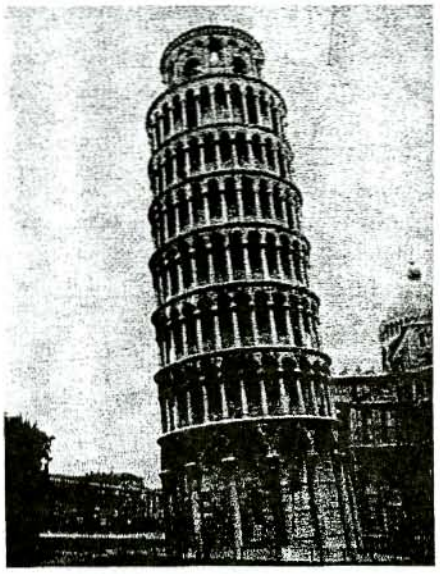

Fig. 1. The Leaning Tower of Pisa

In light of the malaise that the discussion above engenders, whenever a book appears that shows in a clear way the value of mathematical technique and the way that mathematics supports applications, poses interesting questions, and shows connections between different branches of knowledge, it is most welcome. Such a book is *Nexus: Architecture and Mathematics* edited by Kim Williams, published by Edizioni dell'Erba. The book grew out of a conference dealing with the relationships between architecture and mathematics held in June, 1996 near Florence, Italy which was organized by Kim Williams. Ms. Williams is an American-trained architect who now practices in Italy and who has a keen interest in the role that mathematics plays in architecture, and more generally, in the arts and engineering.

The full list of articles in this handsome volume appears below. Physically, the book is set in a easy-to-read, spacious type and profusely illustrated by line drawings and by crisply reproduced photographs. More importantly, the articles which make up the book provide a thoughtful attempt to deal with the support that mathematics provides for architecture, structural engineering and symmetry. The fact that the articles have a rich historical flavor and cover a broad range of times and cultures makes them excellent reading for a varied audience that should include teachers of mathematics at all levels and the general public as well. A knowledge of high school mathematics suffices for reading the book; those with a rusty knowledge will, I believe, find a reason to brush up on what they may have forgotten.

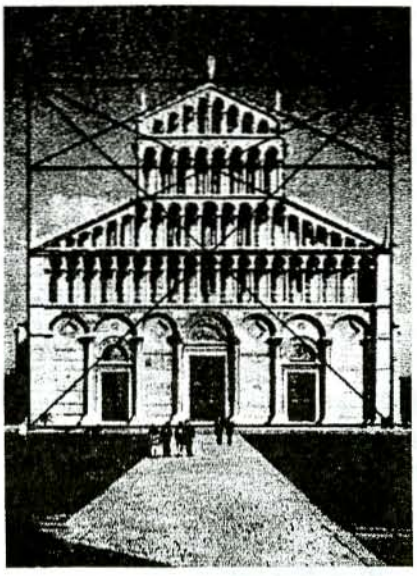

Fig. 3. The facade of the Cathedral of Pisa.

The articles, except for the introductory piece by Mario Salvadori (the very recently deceased author of the seminal book *Why Buildings Stand Up*) are arranged in alphabetical order. However, I did not read them in this order, nor do I suspect that most readers will, although a variety of choices will work. Personally, I started with **The Universality of the Symmetry Concept** (HARGITTAI AND HARGITTAI, figure 7 in the book), which makes the case for a broad approach to symmetry and followed up by reading **Architecture and Mathematics: Soap Bubbles and Soap Films** (EMMER), which provides a very nice history of work on minimal surfaces. From there I turned to the

other pieces, each valuable in its own way.

I was intrigued to read **The Symmetries of the Baptistery and the Leaning Tower of Pisa** (SPEISER, figures 1 and 3 from the book) for personal reasons. I suppose everyone is familiar with the famous Leaning Tower of Pisa through photographs but I was unprepared for the emotions I felt when I got to see the Leaning Tower, Baptistery, and Cathedral in person for the first (and I hope not only!) time. The sheer beauty of these buildings with their exquisite proportions and delicate symmetry can not be done justice in photographs alone! Thus, it was a pleasure to read David Speiser's detailed analysis of the symmetry of these buildings, with his reservations about some aesthetic considerations involving the Baptistery.

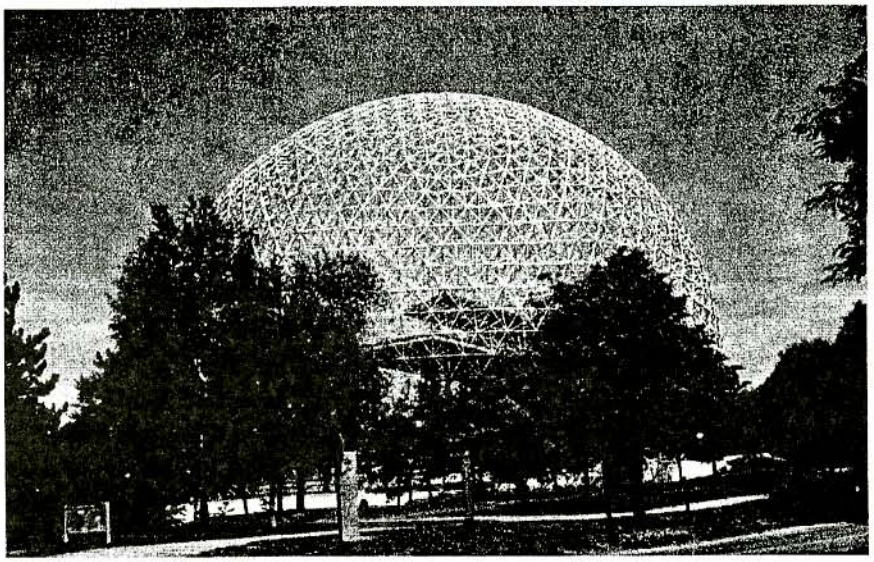

Fig. 7. Buckminster Fuller's Geodesic Dome at the Montreal Expo.

One area that the book does not cover that I would liked to have seen treated is the way that relatively recent support for structural engineering, via the emerging mathematical insights being obtained into rigidity, is inspiring both artists, bridge designers, and architects.

What makes this book exciting is the love of art, architecture, engineering, symmetry, history, and the role that mathematics plays in supporting these areas that perfuses all the articles. I hope this enjoyable and valuable book finds its way to the variety of readers who will enjoy and profit from reading it. Kim Williams deserves our thanks for bringing it to us.

CONTENTS:

MARIO SALVADORI:
Can there be any relationships between Mathematics and Architecture?

BENNO ARTMANN:
The Cloisters of Hauterive

JOHN CLAGETT:
Transformational Geometry and the Central European Baroque Church

MICHELE EMMER:
Architecture and Mathematics: Soap Bubbles and Soap Films

HEINZ GOTZE:
Friedrich II and the Love of Geometry

ISTVAN HARGITTAI AND MAGDOLNA HARGITTAI
The Universality of the the Symmetry Concept

GEORGE GHEVERGHESE JOSEPH:
Geometry of Vedic Alters

JAY KAPPRAFF:
Musical Proportions at the Basis of Systems of Architectural Proportion both Ancient and Modern

DAVID SPEISER:
The Symmetries of the Baptistery and the Leaning Tower of Pisa

LIVIO VOLPI GHIRARDINI:
The Numberable Architecture of Leon Battista Alberti as a Universal Sign of Order and Harmony

CAROL MARTIN WATTS:
The Square and the Roman House: Architecture and the Decoration at Pompeii and Herculaneum

DONALD J. WATTS:
The Praxis of Roman Geometrical Ordering in the Design of a New American Prairie House

KIM WILLIAMS:
Verrocchio's Tombslab for Cosimo de' Medici: Designing with a Mathematical Vocabulary