



INTERNATIONAL SYMPOSIUM  
on  
DOMES  
FROM ANTIQUITY TO THE PRESENT  
MAY 30 - JUNE 3, 1988  
ISTANBUL, TURKEY



MSGSÜ  
Açık Bilim Sanat Ağı



Selimiye Mosque

M.S. Güzel Sanatlar Üniversitesi  
Merkez Kütüphanesi



\*0026120\*

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MSÜ  
1988-9  
1988

Organized by:  
International Association for Shell and Spatial Structures, Madrid  
Mimar Sinan Üniversitesi, Istanbul

SECOND ANNOUNCEMENT

## ORGANIZING COMMITTEE

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## CORRESPONDENCE

Prof.Dr.Ihsan MUNGAN  
 IASS Organizing Committee  
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 Fındıklı-80040 ISTANBUL  
 TURKEY

FAX: 90.1.144 03 98 (Istanbul) (only between 9 a.m.-5 p.m. East European Time)  
 TELEX: 24723 msu tr

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## OBJECTIVES

The dome as one of the structural forms for wide spans has been in frequent use since the earliest cultures and is still among the most popular types of roofing. Pantheon, Hagia-Sophia and Selimiye are historic master-works in masonry and in this type of domes Istanbul is Nr.I in the world.

The oldest large dome of Christendom, Hagia-Sophia, built in 537 AD as Constantinople was the Capitol of the East Roman Empire and the highest dome of Istanbul built in 1556 by Sinan for the mosque of Sultan Süleyman the Magnificent, together with some hundred smaller domes built as Istanbul was the Capitol of the Ottoman Empire, create the fabulous sky-line of the old Metropolis unique in the World.

The symposium is organized on the occasion of the celebration Mimar Sinan's (1490?-1588) 400th Anniversary as one of the many ceremonies which are partly sponsored by UNESCO. Being the Chief Architect and Builder of three Ottoman Sultans, between 1538-1565 of Sultan Süleyman the Magnificent, Sinan had the opportunity to build or to supervise the building of 360 objects including mosques, schools, hospitals, baths, tombs etc., all together more than 200 buildings, with the dome as roofing; in addition many arch bridges and aqueducts. Geographically; the area where he has built reaches from Budapest to Persian Gulf and from Crimea to Mecca on Arabian Peninsula.

The Symposium focuses on domes and provides an international forum for presentations and discussions on historic domes and on modern domes as Reinforced Concrete Shells, Reticulated, Cable-Supported Domes and Air-Supported Membranes with examples from all over the World.

## PROGRAM

(See pages 4 and 5)

IASS-1988-MSU  
DOMES FROM ANTIQUITY TO THE PRESENT  
SYMPOSIUM'S PROGRAM

TIME DAY	ROOM	MORNING		AFTERNOON		EVENING
		9.00 - 10.30	11.00 - 12.30	14.00 - 15.30	16.00 - 17.30	
MAY 30 MO	I	O OPENING CEREMONY	G GENERAL LECTURES	H1 SINAN	H2 ANTIQUE-ROMAN	WELCOME PARTY: PRESIDENT of MSU
MAY 31 TUE	I	H3 BYZANTINE	H4 ISLAMIC	H5 ROMANESQUE and RENAISSANCE	H6 BAROQUE and OTHERS	FREE  (IASS-WORKING GROUPS)
	II	M1 CONTINUUM SHELL	M2 CONTINUUM SHELL	M3 CONTINUUM SHELL	M4 CONTINUUM SHELL	
JUNE 1 WED		Tour to: Süleymaniye Mosque, Hagia Sophia, Sultanahmet, Topkapı Seraglio (Lunch), Golden Horn, Bosphorus				FREE
JUNE 2 THU	I	M5 RETICULATED	M7 RETICULATED	M9 RETICULATED	C CLOSING CEREMONY	SYMPOSIUM  DINNER
	II	M6 AIR-SUPPORTED	M8 CABLE-SUPPORTED	M10 CABLE-SUPPORTED	-	
JUNE 3 FRI		TOUR to EDİRNE : Visit of SELİMİYE Mosque (1575), SİNAN'S MASTERWORK DOME				FREE

REGISTRATION : May 29, SU 10.00-21.00; May 30, MO 7.30-9.00



IASS - ISTANBUL 1988: DOMES FROM ANTIQUITY TO THE PRESENT  
S P O U S E S ' P R O G R A M

Time Day	MORNING		AFTERNOON	EVENING
	9.00 - 10.30	11.00 - 12.30		
MAY 30, MON	OPENING CEREMONY	GENERAL LECTURES	EUROPEAN ISTANBUL Galata, Beyoğlu, Nişantaşı	WELCOME PARTY: PRESIDENT of MSU
MAY 31, TUE	LATE OTTOMAN PALACES ALONG BOSPHORUS Dolmabahçe, Yıldız (fashion Show, Lunch) Beylerbeyi, Küçüksu, Hıdıv (Coffee party at Asian side of Bosphorus)			FREE
JUNE 1, WED	Tour to: Süleymaniye, Hagia Sophia, Sultanahmet, Topkapı Seraglio (Lunch), Golden Horn, Bosphorus			FREE
JUNE 2, THU	Tour to PRINCE ISLANDS (possibility of swimming) or TREASURE of TOPKAPI SERAGLIO and GREAT BAZAAR			SYMPOSIUM DINNER
JUNE 3, FRI	TOUR to EDİRNE: Visit of SELİMİYE MOSQUE (1575), (SİNAN'S MASTERWORK DOME)			FREE

REGISTRATION : May 29, SU 10.00-21.00; May 30, MO 7.30-9.00

## CONTENT of the SESSIONS

## O : OPENING CEREMONY

Speech of the President of MSU Prof.Gündüz GÖKÇE

Speech of the President of IASS Prof.Dr.Yashikatsu TSUBOI

Speech of the Lord Mayor of ISTANBUL Mr.Bedrettin DALAN

## G : GENERAL LECTURES

B.ÜZER: Sinan-The Great Master of Pluralism in Architectural Creation

R.JODICE : The Iron Dome in Nineteenth Century

MAKOWSKI,Z.S.: History of Developments of Braced Domes

## H 1 : SINAN'S DOMES

H.GÜNGÖR\* : The Dome in Sinan's Works

E.KARAESMEN and A.İ.ÜNAY:The Importance of the Dome with Respect of Optimization of the Structural System and Space with Examples from Sinan's Mosques

I.MUNGAN: On the Structural Development of the Ottoman Dome with Special Emphasis on Sinan

H.ABBASOĞLU : The Dome-The Behavior Enclosed, The Symbolism Conveyed by It

## H 2 : ANTIQUE AND ROMAN DOMES

G.W.Van BEEK\* : Early Domical Constructions in the Ancient Near East

R.GOSHIMA:Estimation of Structural Design Technique of the Pantheon in Ancient  
G.A.DOSSAT:The Dome of Pantheon and Its Importance in the History of Architecture

G.ZANDER : The Domes of Late Roman Empire at Rome and Environs.

C.BLASI and F.P.FIORE: New Elements on the Dome of the so-called Temple of Romulus in the Roman Forum

N.ÜZGÖNÜL and E.MADRAN: The Documentation of Rock-Cut Domes of Cappadocia

G.CIOTTA : Domes in the Normand Architecture of Sicily

## H 3 : BYZANTINE DOMES

R.MARK and A.WESTARGARD\* : Original Dome of the Hagia Sophia

N.ÜZGÖNÜL and E.MADRAN: Structural Analysis and Deformations of the Domes of Ayasofya-A Photogrammetrical Survey

S.KATO, A.K.HIDAK and T.AOKI: Structural Efficiency of the Fossati-Rings in the Dome of Hagia Sophia, Istanbul

C.BOZZONI : Byzantine and Post-Byzantine Domes in South Italy

\* Key Note Lecture

## H 4 : ISLAMIC DOMES

M.ROSEN-AYALON\* :The Dome of the Rock-A Land-Mark in the History of Architecture

E.GALDIERI: Persian Domes With Crossed Arches (XII-XVII Century)

E.CUNEO : About the Double-Domes in Timurid Architecture

S.HAFIZ-UR-RAHMAN : Domes in the Muslim Architecture of the Indo-Pak Sub-Continent

R.SUNDARAM : Historic Dome Built in South India During 17th Century

A.M.AHMET : Beyond the Dome

D.RASTORFER : The Domes of Hasan Fathy

## H 5 : ROMANESQUE AND RENAISSANCE DOMES

M.SALVATORI : The Wooden Superstructures of the Domes of the St.Antony's Basilica in Padua

S.B.BATI, M.PARADISO, G.TEMPESTA and U.TONTUETTI: Parma-Cathedral-A Singular Example of Structures in the Transition Period Between Romanesque and Gothic

A.BRUSCHI : Studies for the Dome of St.Peter's from Bramante to Antonio de Sangallo J.

E.C. ROBISON : St.Peter's Dome and the Poleni Restoration

S.KATO, K.HIDAKA and T.AOKI : Structural Role of the Wooden Ring of the Cupola of Santa Maria del Fiore

A.GIUFFRE : Ancient and Modern Static Analysis of the Vatican Dome

M.DOCCI and G.ZANDER : Geometry and Structure of the Domes of Eight Octogonal Rooms in the "Basilica di San Pietro" in the Vatican

S.BENEDETTI : "Santa Maria di Loreto alla Colonna Traiana" in Rome

## H 6 : BAROQUE DOMES AND OTHERS

I.HRUBAN : Historic Domes from Czechoslovakia

R.CIESELKI: Historical Cracow Churches from Various Centuries, Problems of Statics, Dynamics, Structure and Technical Preservation

G.PIZETTI : Restoration and Strengthening of the Elliptical Dome of Vicoforte Shrine

S.DI PASQUALE : On the Equilibrium of Masonry Domes

S.TOBRINER : The Failure of San Francisco's City Hall in the Earthquake of 1906

T.NAGASE and T.HISATAKU : An Analytical Study of the Stone-Chamber Structure of Ancient Asuka Burial-Mounds of Ishibutai and Tsukamyojin in Japan

S.DI PASQUALE and T.AOKI : Finite Element Analysis of Masonry Domes

#### M 1 : CONTINUUM SHELL DOMES

H.RÜHLE\* : Experiences with Shell Domes System Zeiss Constructed from 1923 up to Now

K.PARSONS : Dome Design and Construction in the United States of America

I.HRUBAN : Modern Domes from Czechoslovakia

A.P.RAO and S.N.CHAWLA : Pyramid Type Roof of a Triple Prayer Hall

M.MIHAILESCU, I.BUCUR and T.ITUL: Two Nonclassical Dome Forms Made of Precast and Prestressed Concrete

#### M 2 : CONTINUUM SHELL DOMES

T.KOKAWA : Construction and Creep Test of 15m Ice Dome

K.SHINGU and T.NISHIMURA : Dynamic Response of Spherical Shells with Edge Beams Subjected to Earthquakes in the Vertical and Horizontal Directions

T.J.KWUN and G.-PARK : A Rigid Element Model for Elasto-Plastic Analysis of Thick Spherical Shell

I.G.LYUDKOVSKII, M.A.IVANOV, A.V.PASYUTA and A.A.FILYAKIN: Suspended Reinforced Concrete Shells with External Sheet Reinforcement

H.KUNIEDA : Responses of Spherical Domes Subjected to Earthquakes

#### M 3 : CONTINUUM SHELL DOMES

N.NOOSHIN\* : Formex Formulation of Dome Configurations

P.TUOMINEN : Determination of the Static of an Axisymmetric Thin FEM - Element by a Shooting Method

G.QU : Direct/Iterative Methods in Structural Analysis

K.MITSUI and K.SUMINO : Stability Analysis of Circular Cylindrical Shell Subjected to Tangential Follower Forces

D.SHENGLIN and S.QIGEN : Nonlinear Analysis of Reinforced Concrete Shells

#### M 4 : CONTINUUM SHELL DOMES

Ph.L.GOULD : Analysis of Anisotropic Domes Using Rotational Shell Finite Elements

E.SAVORY and N.TOY : The Wind Flow Around Dome Structures

C.A.CHOWDHURY : Dome Shaped Folded Surface Structures

S.ŞENER : Ribbed Cylindrical Shells in Circumferential Direction under the Statical Loads

M.TAKAYAMA and Y.HANGAI : Comparison of Failure Mechanisms of R.C.Domes and Single-Layer Reticulated Domes

#### M 5 : RETICULATED DOMES

T.MAENO, M.WADA, T.NAGASE and T.HISATOKU: Structural Design and Construction of Timber Lattice Shell

N.SUBRAMANIAN and K.K.GANGULY : Design of 67m Dia Dome for an Indoor Stadium at Cuttack, India

I.KUBODERA and Y.KANEBAKO : The Design and Construction of Steel Space Structure for Tropical Plants

P.D.PAKANDAM and D.I.RETIEF : Comparison of Stress Distribution and Deflections in a Geodesic Dome as a Function of Different Boundary Conditions

S.L.MA : A New Type of Hemispherical Connector System for Analysis, Test and Application

#### M 7 : RETICULATED DOMES

H.ROTHERT and N.GEBBEKEN : On the Finite Element Computation of the Load Carrying Capacity of Reticulated Space Trusses Using the Plastic Hinge Theory

T.ONO, M.IWATA, H.KIRIYAMA and K.KAMIYAMA : Study of the Structural Safety of Spherical Dome Constructed Using Steel Pipe Space Truss System

J.L.MEEK and S.LOGANATHAN : Geometrically Nonlinear Behaviour of Geodesic Dome Structures

A.HASEGAWA, T.MATSUNO and F.NISHIO : Elastic Instability and Nonlinear Analysis of Thin-Walled Members Under Nonconservative Forces

#### M 9 : RETICULATED DOMES

T.TANAMI, Y.HANGAI and T.YAMAGAMI : Dynamic Behaviours of Single-Layer Reticulated Domes Due to Up-and-Down Excitations

H.L.ZHAO and G.Z.CHAO : Large Displacement Elastic Buckling of Space Structures

M.SAITOH, F.KUROKI and T.OKUHARA : Study on the Buckling Strength of Single-Layer Truss Dome

P.LENZA : Local Instability of Doubly Curved Vaults

Y.HANGAI and S.OHYA : Estimations of Buckling Formulas of Reticulated Single-Layer Domes

#### M 6 : AIR-SUPPORTED MEMBRANES

M.KAWAGUCHI\* : Air Supported Domes

P.G.GLOCKNER, W.SZYSZKOWSKI and A.DACKO : Further Results on the Behaviour of Spherical Inflatables

T.HONMA, M.NAKAYAMA, T.SUZUKI, T.ARAI and N.SAKANE: Minimum Surface Problem for Membrane Structures

Y.HANGAI and K.-I.KAWAGUCHI : Shape Finding of Air-Supported Domes along the Unstable Process of Inflation

S.MOTOYUI and T.OGAWA : Investigations on Wrinkling Problem of Membrane Structures

#### M 8 : CABLE - SUPPORTED MEMBRANES

H.BERGER\* : Lightweight Domes for Sports Stadiums

H.ITOH, T.KIKUCHI and K.TANAKA : Construction of membrane Panels for Rigid Boundary Suspension Membrane Structures

M.SAITOH and F.KUROKI : Hybrid Tension Truss Dome

Y.TANNO, H.MIYAKE, T.YANO and Y.IWASA : Structural Design of Tokyo Dome "Big Egg" - A Large Scale Low -Profile Cable-Reinforced Air-Supported Structure

M.SAITOH, I.TODA, K.KUDOH and T.OKUHARA : Design and Construction of Tension Truss Dome

#### M 10 : CABLE - SUPPORTED MEMBRANES

N.SAKANE, T.SUZUKI, M.NAKAYAMA, T.ARAI and T.HONMA : An Experimental Study on One-Way Cable Reinforced Air-Supported Structure

E.A.UZGIDER and A.K.ŞANLI : Dynamic Response of Large Span Cable Net Roofs to Travelling Ground Motion

B.HUSIAR : Creep and Calculation Dynamic of Cable Suspended Roofs

E.A.UZGIDER and F.PIROÇLU : A.Simple Nonlinear Solution Method for Cable Net Structures

M.SAITOH, F.KUROKI, K.SUGIZAKI and H.NAKAJIMA : Experimental Study of the Structural Properties on the Unit Type of Hybrid Membrane Structures

After each session there will be 15 minutes time for discussions and a 15 minutes break.

#### C : CLOSING CEREMONY

B.ÖZER, I.MUNGAN, M.KAWAGUCHI and S.MEDWADOWSKI

#### PROCEEDINGS

The Proceedings of the Symposium will contain nearly 100 papers giving two Volumes of about 1000 pages. The Volumes will be handed over to the participants on the first day of the Symposium.

#### LANGUAGE

The language of the Symposium is English. All presentations and discussions will be in English.

#### VENUE AND HOTELS

The Symposium will be held at the Hilton International Istanbul. This most luxurious hotel has accepted to reserve a limited number of single and double rooms for the participants to following reduced rates/per day:

Single room	: USD 76 + tax + service
Double room	: USD 87 + tax + service
(In 1988 tax + service are 28.8 %)	

As most of the participants have preferred the Hilton Hotel, at the moment there are only 18 rooms left for reservation at this hotel. After March 31, 1988 no more reservations to reduced rates and perhaps also to regular rates will be possible. The date of the Symposium is high season of Istanbul and it may be very difficult to find a room. We have already forwarded the "Notices of Intended Participation" received to the Hilton Hotel, so you may be sure that your room is reserved for you until 6 p.m.(18 o'clock)at the day of arrival

which you have indicated in your "Notice". In case of any change in your trip or if your arrival will be later than 6 p.m. please contact directly the Hilton Hotel and indicate the change, your Airline and Flight Number, otherwise your reservation will be cancelled.

Address : Hilton International Istanbul  
Cumhuriyet Caddesi  
Harbiye-ISTANBUL/TURKEY

Tel : 131 46 46 (Istanbul)  
Telex : 27027 h11s tr  
Fax : 140 41 65 (Istanbul)

We have forwarded the "Notices of Intended Participation" of the participants preferring an accomodation up to USD 60 + tax + service or USD 50 + tax + service to the Maçka Oteli. Although the room rates at Maçka Oteli will be fixed up first in March 1988, they will be in the ranges given. From the rooms reserved in Maçka Oteli for the Participants of the Symposium there are 8 rooms still available. In the case of any change in your trip or if your arrival will be later than 6 p.m. at the day of arrival which you have indicated in your "Notice" please contact directly the Maçka Oteli and indicate your change, your Airline and Flight Number, otherwise your reservation will be cancelled.

Address : Maçka Oteli  
Eytam Caddesi No.35  
Maçka-Istanbul/TURKEY

Tel : 134 32 00 (Istanbul)  
Telex : 28002 mako tr  
Fax : 140 76 94 (Istanbul)

#### FEES

	Until March 31, 1988	After March 31, 1988
Members of IASS or MSU	USD 200	USD 250
Non-Members	USD 250	USD 300
Accompanying Persons	USD 100	USD 150

The fees given above cover the participation at the sessions, the Symposium Proceedings, the Opening Reception, Coffee Breaks, Symposium Dinner accompanied with oriental show and belly-dancing, a guided marvelous one-day trip through Bosphorus and in Istanbul. Because 70 participants have been interested to

visit Mimar Sinan's masterwork Selimiye Mosque in Edirne (the second Capitol of the Ottoman Empire) the alternative Istanbul or Edirne has been changed and the visit to Edirne, including lunch has been added to the main program without additional fee. The trip to Edirne takes 3,5 hours in air-conditioned luxurious Neoplan busses with board service, on the highway from Turkey to Greece and Bulgaria. A number of cultural tours (see Spouses'program) are arranged for the Accompanying Persons.

#### PAYMENT

Payment should be preferably made as bank transference to the following account established for this Symposium:

Payee : Mimar Sinan University "DOMES"

Bank : Türkiye İş Bankası A.Ş. Kabataş Şubesi  
Istanbul-Turkey, Telex: 24178 gnyd tr

Account No : 30100-1512

Bank cheques in USD payable to Mimar Sinan University "DOMES" can also be accepted, however, banking charges must be borne by the applicant.

#### POST - SYMPOSIUM TOURS

According to the "Notices of Intended Participation" returned, 23<sup>7</sup> participants are interested only in Post-Symposium tours, 1 participant only in Pre-Symposium tours and 46 participants are interested in both. For this reason we have decided to offer two one-week Post-Symposium Tours each starting on June 4 and ending on June 11, 1988:

Tour I : Istanbul-Ankara-Cappadocia-Hierapolis-İzmir-Ephesus-Pergamon-Troy-Istanbul

Tour II : Istanbul-Bursa-Troy-Ayvalık-Pergamon-Kuşadası-Milet-Dydıma-Priene-Ephesus-Hierapolis-Izmir-Istanbul.

Rates in Deutsche Mark (DM) are:

Tour I : Double room per person DM 610.-  
Single room DM 850.-

Tour II : Double room per person DM 595.-  
Single room DM 820.-

For more information evtl. extension of your trip, Blue Voyage etc. and for tour-reservation please contact directly the Travel Agent for the tours indicating that you are attending the IASS-MSU Symposium on "DOMES":

Address : Milliyet Holiday - MILTA  
Travel Agency  
Cumhuriyet Caddesi No.14  
Elmadağ-Istanbul/Turkey

Phones : 133 03 43-44, 146 05 20-21-22-23 (Istanbul)

Telex : 27 270 tamir tr

Milta wishes that you contact them as soon as possible, but not later than the end of February 1988.

#### CLIMATE and CLOTHING

During the days of the Symposium Istanbul is expected to be relatively warm - daily temperature  $20^{\circ}$  -  $25^{\circ}$  C (68-77 Fahrenheit) - and sunny. In the regions of the Post-Symposium Tour the daily temperatures may be even higher, however, the nights relatively Cool. We recommend you to add one or two warm articles to your summer clothing. We are looking forward to welcoming you in Istanbul.

