

Annual Report 2009

Contents

1. Aim of the Association
2. Executive Committee 2009
3. Activities
 - 3.1 General
 - 3.2 Technical lectures 10 November 2009
 - 3.3 DOV 25 years
 - 3.4 Int. DIANA Users Meeting 2009, 4-5 June 2009, Delft, The Netherlands
4. Financial aspects 2009
5. Publication list
6. Memberslist

1 Aim of the Association

The members of the Association are all users of the DIANA software package of TNO-DIANA BV.

In this capacity, they have a considerable interest in gaining knowledge in the Finite Element Method and (numerical) mechanics, as well as in the further development and extension of DIANA.

To achieve this, the Association fulfils a coordinating role by taking stock of the members' needs in terms of research and development, and initiating new projects.

The Association is also a meeting place for the exchange of experiences with the software package.

Furthermore, TNO-DIANA BV utilizes the Association to inform the Users on the DIANA package development progress.

2 Executive Committee 2009

During this reporting year, the Executive Committee consisted of:

Chairman: ir. A. de Boer, Centre for Public Works, Ministry of Transport,
Public Works and Water Management, Utrecht
Secretary/ Treasurer: ir. N. Vollema, Royal Haskoning, Nijmegen
Committee member: dr.ir. F. Galanti, TNO Built Environment and Geosciences

The Executive Committee has mainly dealt with the following:

1. Discussion on continuing new research projects on the basis of a national and international user's wish list.
2. Organizing of the 6th International DIANA Users Meeting in Delft, the Netherlands.
3. Organising another 5-year anniversary of the Association in Delft, the Netherlands
4. Continuing contributing to the set-up a database with publications related to DIANA or FEA.
5. Extending the existing e-mail database with foreign users in the fields of concrete, concrete mechanics, bridges and tunnels.
6. Preparation of general and technical meetings.
7. Association finance.
8. Progress in an international response/discussion forum around developments now and in the future related to Users Wishes.

3 Activities

3.1 General

The Association holds a general meeting of members twice a year, followed if possible by a technical meeting (lectures). In 2009 there was held only one technical meeting, a lecture evening.

3.2 Technical lectures 10 November 2009

Capturing complex non-linear structural response through a series of linear analyses

Anne van de Graaf, Delft University of Technology

Falling anchor Kiltunnel

Henco Burggraaf, TNO Built Environment and Geosciences

The mechanical behaviour of concrete hollow-core slabs under different loads

Ab van den Bos, ABT Consultancy

Reserve capacity of beam ‘Shear8’

Chantal Frissen, TNO DIANA BV

Shear8, a benchmark ?

Joop den Uijl, Delft University of Technology

3.3 DOV 25 years

Celebration program

Start and development of the Users Association

Hans Jongedijk, formerly president DIANA Users Association till ‘97

Concrete Mechanics development over the last 25 years

Jan Rots, Delft University of Technology, The Netherlands

DIANA development in past and future

Gerd-Jan Schreppers, TNO DIANA bv, The Netherlands

Sculpture in Larvikitt

Karl Vincent Høiseth, Norwegian University of Science and Technology, Norway

Winner of the FE competition 2009

Cor van der Veen, Delft University of Technology, The Netherlands

3.4 International DIANA Users Meeting, 4-5 June 2009, Delft, the Netherlands

Lectures

Hybrid concrete beams with lightweight concrete and fibre-reinforcement

Jan Arve Øverli, Norwegian University of Science and Technology, Norway

Numerical analysis of building damage due to tunnelling: from 3D to 2D modelling

Giorgia Giardina, Delft University of Technology, The Netherlands

Settlement risk assessment for the North/Southline

Richard Roggeveld, Witteveen + Bos consulting engineers, The Netherlands

Failure behavior of a prestressed concrete box girder bridge

Chantal Frissen, TNO DIANA BV, The Netherlands

Parametric and associative modeling development as new approach for structural design in addition to finite element analysis

Eliza Guse, Delft University of Technology, The Netherlands

A model which includes compressive membrane action

Gert-Jan Bakker, Royal Haskoning, The Netherlands

Numerical simulation of the behaviour of a gusset plate connection under cyclic loading

Roberto Nascimbene, EUCENTRE, Pavia, Italy

Design of the cross-passages in the shield driven tunnels of the North/Southline

Frank Haring, Witteveen + Bos consulting engineers, The Netherlands

Analysis and design of a liquefied natural gas storage tank under spill and fire load conditions

Apostolos Tsouvalas, Royal Haskoning, The Netherlands

Concrete Floating Storage and Offloading Unit (FSO)

Karl V. Hoiseth, Norwegian University of Science and Technology, Norway

The sensitivity of Sequential Linear Analysis schemes to the number of saw-teeth in the material softening diagram

Anne van der Graaf, Delft University of Technology, The Netherlands

Modeling of severely corroded reinforced concrete beam with anchorage failure

Kamyab Zandi Hanjari, Chalmers University of Technology, Sweden

Blastanalysis on a Liquid Storage Tank

Marcel 't Hart, Royal Haskoning, The Netherlands

4. Financial aspects 2009

5. Publication list

TNO Built Environment & Geosciences, BU GeoEnergy

Papers and abstracts

Orlic, B.,

Some geomechanical aspects of geological CO₂ sequestration, KSCE Journal of Civil Engineering, Korean Society of Civil Engineers, Springer, 2009, Vol. 13, No. 4, pg. 225-232.

Orlic, B.,

Assessing the Mechanical Impact of CO₂ Injection on Faults and Seals, Proc. of the 2nd International Conference on Fault and Top Seals - From Pore to Basin Scale. Montpellier, France, 2009, Abstract P21, pg.184-186.

Reports

Hofstee, C., Benedictus, T., ter Heege, J., Huilbregtse, J., van der Meer, B.,

Nelskamp, S., Orlic, B., Plymaekers, M., Tambach. T.,

Feasibility of CO₂ Storage in the Friesland platform (part of the report on Geomechanical evaluation), TNO report 034-UT-2009-01084, 2009(confidential)

TNO DIANA BV

C.M. Frissen,

Analyses ULS behaviour and ULS capacity bridge Heteren fase 3: Plane stress model, TNO report 2009-DIANA-R001. 20 April 2009, 177 pp., CONFIDENTIAL

T. Rahman, E.L. Jansen,

A Finite Element Based Perturbation Method for Dynamic Buckling Analysis of Shell Structures, 50th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference
17th ,4 - 7 May 2009, Palm Springs, California, 13 pp.

T. Rahman, E.L. Jansen,

Finite Element Based Multi-Mode Initial Post-buckling Analysis of Composite Cylindrical Shells, Thin-Walled Structures, Volume 48, Issue 1, January 2010, pg. 25-32.

T. Tahman, E.l. Jansen, P. Tiso,

A FINITE ELEMENT BASED PERTURBATION METHOD FOR NONLINEAR FREE VIBRATION OF COMPOSITE CYLINDRICAL SHELLS, Proceedings of the ASME 2009 International Mechanical Engineering Congress & Exposition IMECE2009, November 13-19, 2009, Lake Buena Vista, Florida, USA

T. Rahman, S.T. IJsselmuiden, M.M. Abdalla, E.L. Jansen

POSTBUCKLING ANALYSIS OF VARIABLE STIFFNESS COMPOSITE PANELS USING A FINITE ELEMENT BASED PERTURBATION METHOD, Proceedings of the ASME 2009 International Mechanical Engineering Congress & Exposition IMECE2009, November 13-19, 2009, Lake Buena Vista, Florida, USA

T. Rahman, E.L. Jansen

Finite element based coupled mode initial post-buckling analysis of a composite cylindrical shell, *Thin-Walled Structures*, 2010, vol. 48, no1, pg. 25-32

University Minho

Book Chapters / Invited lectures

Lourenço, P.B.,

Recent advances in masonry structures: Micromodelling and homogenisation, em: *Multiscale Modeling in Solid Mechanics: Computational Approaches*, Eds. U. Galvanetto, M.H. Ferri Aliabadi, Imperial College Press, pg. 251-294 (2009)

Lourenço, P.B., Mendes, N., Marques, R.,

Earthquake design and assessment of masonry structures: Review and applications, em: *Trends in Civil and Structural Engineering Computing*, Eds. B.H.V. Topping, L.F. Costa Neves, R.C. Barros, Saxe-Coburg Publications, pg. 77-101 (2009)

Lourenço, P.B., Ramos, L.F., Krakowiak, K.J.,

Cathedral of Porto, Portugal: Conservation works 2003-2008, *Proceedings of 11th Canadian Masonry Symposium*, May 31-June 3, Toronto, Ontario, Canada, CD-ROM, 20 pp. (2009)

International Journals

Amado, M., Lourenço, P.B., Peña, F.,

Virtual reconstruction of Medieval monastery using Computer-Aided Design model, *Journal of Architectural Engineering*, ASCE, 15(4), pg. 131-138 (2009)

Milani, G., Lourenço, P.B., Tralli, A.,

Homogenized rigid-plastic model for masonry walls subjected to impact, *International Journal of Solids and Structures*, 46(22-23), pg. 4133-4149 (2009)

Vasconcelos, G., Lourenço, P.B.,

In-plane experimental behavior of stone masonry walls under cyclic loading, *Journal of Structural Engineering*, ASCE, 135(10), pg. 1269-1277 (2009)

Senthivel, R., Lourenço, P.B.,

Finite element modelling of deformation characteristics of historical stone masonry shear walls, *Engineering Structures*, 31(9), pg. 1930-1943 (2009)

Vasconcelos, G., Lourenço, P.B.,

Experimental characterization of stone masonry in shear and compression, *Construction and Building Materials*, 23(11), pg. 3337-3345 (2009)

Vasconcelos, G., Lourenço, P.B., Alves, C.A.S., Pamplona, J.,

Compressive behavior of granite: Experimental approach, *Journal of Materials in Civil Engineering*, 21(9), pg. 502-511 (2009)

Milani, G., Lourenço, P.B.,
Blast analysis of enclosure masonry walls using homogenization approaches,
International Journal for Multiscale Computational Engineering, 7(2), pg. 91-113
(2009)

Zucchini, A., Lourenço, P.B.,
Validation of a micro-mechanical homogenisation model: Application to shear walls,
International Journal of Solids and Structures, 46(3-4), pg. 871-886 (2009)

Milani, G., Lourenço, P.B.,
A simple discontinuous upper bound limit analysis approach with sequential linear
programming mesh adaptation, International Journal of Mechanical Sciences, 51(1),
pg. 89-104 (2009)

International Conferences

Marques, R., Gouveia, J.P., Lourenço, P.B. and Leão, C.,
Development of design software for plain masonry buildings, Proceedings of the
Twelfth International Conference on Civil, Structural and Environmental Engineering
Computing, September 1-4, Funchal, Madeira, CD-ROM, paper 144 (2009)

Lourenço, P.B., Milani, G., Zucchini, A.,
Recent advances in masonry homogenization, Proceedings of the Computational
Modeling Workshop on Concrete, Masonry and on Fiber-reinforced Composites, June
17-18, Delft, the Netherlands, pg. 35-39 (2009)

Mendes, N., Lourenço, P.B.,
Comparison of different seismic non-linear analyses of an ancient masonry building,
Proceedings of the 11th Canadian Masonry Symposium, May 31-June 3, Toronto,
Ontario, Canada, CD-ROM, 10 pp (2009)

Lourenço, P.B., Leite, J.C., Paulo-Pereira, M.F.,
Masonry infills and earthquakes, Proceedings of the 11th Canadian Masonry
Symposium, May 31-June 3, Toronto, Ontario, Canada, CD-ROM, 10 pp (2009)

Haach, V.G., Vasconcelos, G., Lourenço, P.B.,
Assessment of the flexural behavior of concrete masonry lintels, Proceedings of
Materials 2009, April 5-8, Lisboa, CD-ROM, 6 pp (2009)

Haach, V.G., Vasconcelos, G., Lourenço, P.B.,
Influence of the geometry of units and filling of vertical joints in the compressive and
tensile strength of masonry, Proceedings of Materiais 2009, April 5-8, Lisboa, CD-
ROM, 6 pp (2009).

Eindhoven University

P.A. Teeuwen,
LATERAL BEHAVIOR OF STEEL FRAMES WITH DISCRETELY CONNECTED
PRECAST CONCRETE INFILL PANELS, PhD thesis, Eindhoven, ISBN 978-90-
6814-622-6, Nov. 2009, 211 pp.

E.L.Klamer,
INFLUENCE OF TEMPERATURE ON CONCRETE BEAMS STRENGTHENED
IN FLEXURE WITH CFRP, PhD thesis, Eindhoven, ISBN 978-90-6814-619-6, Nov.
2009, 276 pp.

E.M.P. Huveners, F. van Herwijnen, F. Soetens, H. Hofmeyer,
Bracing Steel Frames with Adhesively Bonded Glass Panes - Mechanic Models, Glass
Performance Days, 11th International Conference on Architectural and Automotive
Glass, Conference proceedings Glass Performance Days, 11th International
Conference on Architectural and Automotive Glass. - Tampere, Finland : Glass
Performance Days, Glaston Finland Oy, 2009. - ISBN 978-952-5836-01-1. - pg. 256-
260

E. M.P. Huveners,
Circumferentially adhesive bonded glass panes for bracing steel frames in facades,
PhD thesis, Eindhoven, ISBN 978-90-6814-621-9, Dec. 2009, 235 pp.

RWS Centre for Infrastructure & Delft University of Technology

A de Boer, C. van der Veen,
Full control in designing of RC structures, FIB 2009 Symposium, *fib*, London, United
Kingdom, CDROM, pp. 8, June 2009

RWS Centre for Infrastructure & TNO DIANA BV

A. de Boer, C.M. Frissen,
Remaining load capacity of a Two-cell box girder concrete bridge, Nafems World
congress, NAFEMS, 2009, Kreta, Greece, CDROM, pp. 12

RWS Centre for Infrastructure

A. de Boer, "How to come to an acceptable Unity Check index for existing concrete
structures in infrastructure", Workshop Existing structures, *fib* SAG7, Torino, Italy,
October 2009

A. de Boer, "Unity checks and probabilistic analysis", JCSS Workshop, Delft,
December 2009

6. Memberlist

Ingenieursburo Zonneveld BV
t.a.v. J.P. van der Windt
Max Euwelaan 23
3062 MA Rotterdam
windt@zonneveld-rotterdam.nl

Gemeentewerken Rotterdam
t.a.v. P. Jongbloed
Postbus 6633
3002 AP Rotterdam
p.jongbloed@gw.rotterdam.nl

GeoDelft
t.a.v. J.A.M. Teunissen
Postbus 69
2600 AB Delft
j.a.m.teunissen@geodelft.nl

Rijkswaterstaat Dienst Infrastructuur
t.a.v. A. de Boer
Postbus 20.000
3502 LA Utrecht
ane.de.boer@rws.nl

TU Delft
Faculteit CITG
t.a.v. W. J.M. Peperkamp
Postbus 5048
2600 GA Delft
w.peperkamp@tudelft.nl

TU Eindhoven
Faculteit Bouwkunde
t.a.v. P.A. Teeuwen
Postbus 513
5600 MB Eindhoven
p.a.teeuwen@bwk.tue.nl

DHV B.V.
t.a.v. J. Truijens
Postbus 2081
1500 GB Zaandam
joris.truijens@dhv.com

Shell Int. Exp. and Prod. B.V.
t.a.v. F. de Bree
(RIJ-KES ZA015B)
Postbus 60
2280 AB Rijswijk
f.de.bree@shell.com

ABT
t.a.v. ing. A.A. van den Bos
Postbus 82
6800 AB Arnhem
a.vd.bos@abt-consult.nl

Royal Haskoning
t.a.v. D.J. Peters
Postbus 151
6500 AD Nijmegen
dj.peters@royalhaskoning.com

Witteveen+Bos
t.a.v. F. Kaalberg
Postbus 233
7400 AE Deventer
frank.kaalberg@nzlijn.nl

TNO Bouw en Ondergrond
Afdeling Civiele Infrastructuur
t.a.v. F. Galanti
Postbus 49
2600 AA Delft
flavio.galanti@tno.nl

TNO Bouw en Ondergrond
Geo Energie en Geo Informatie
t.a.v. B. Orlic
Postbus 80015
3508 TA Utrecht
Bogdan.Orlic@tno.nl

TU Delft
Faculteit Bouwkunde
t.a.v. E.A. Guse
Berlageweg 1
2628 CR Delft
e.a.guse@tudelft.nl

Montan University Leoben
Attn. Prof. H. Harmuth
Franz-Josef Strasse 18
A-8700 Leoben, Austria
Harald.harmuth@unileoben.ac.at

TU Delft
Faculteit CITG
t.a.v. J.G. Rots
Postbus 5048
2600 GA Delft
j.g.rots@tudelft.nl

NTNU Faculty of Engineering Science and Technology
Attn. K.V.Høiseth
Department of Structural Engineering
7491 Trondheim, Norway
Karl.hoiseth@ntnu.no

Corresponding participants:

TNO DIANA BV
t.a.v. G.J. Schreppers
Schoemakerstraat 97
2628 VK Delft

TNO DIANA BV
t.a.v. G. Lilliu
Schoemakerstraat 97
2628 VK Delft

TNO DIANA BV
t.a.v. W.P Kikstra
Schoemakerstraat 97
2628 VK Delft