

The 2nd Advanced Research Workshop on Transformers (ARWtr2007) is jointly organised by Department of Electrical Engineering-University of Vigo-Spain and Institute of Mechatronics and Information Systems-Technical University of Lodz-Poland.

After success of ARWtr 2004 (<http://webs.uvigo.es/arwtr04>) in Vigo-Spain, this next edition, **Advanced Research Workshop on transformers (ARWtr 2007)** will be held under honorary patronage of CIGRE Spanish and Portuguese National Committee, Study Committee of Transformer A2, and IEEE Power Engineering Society Spanish Chapter.

Electrical Transformers are living a "gold" period from the last three years, since the global demand is being the double compare with previous 25 years. In this new stage under economic pressure traditional habits must be questioned now: ageing technology and conservatism in the approach to innovation are being blamed and have created a situation where reliability is under questions. Close cooperation between users and manufacturers is essential in achieving success in life cycle management of transformers.

This 2nd **Advanced Research Workshop on transformers (ARWtr 2007)**, devoted to issues related with Electrical Transformers, mainly Power in this edition, will be held in The Royal Village of Baiona-Spain, in October (28)29-31, 2007.

Baiona is a nice old town on Galician coast very close to city of Vigo, and no far from Porto-Portugal and Santiago de Compostela cities. Places where its beauty, people, good environment, wine and cuisine, and its cultural heritage offer a specific atmosphere.

The ARWtr2007 venue will be the Parador Royal Palace, a Middle Age castle transformed into a nice state hotel. The Parador lies within the precinct of The Royal Hill, surrounded by its fortified walls, before it was colonized by the Romans in the second century B.C., from where there is an incomparable view on Atlantic shore and well-known Rias, natural estuaries formed by mountains, beaches and sea.

The present ARWtr2007 has the privilege to celebrate the 80th birthday of Professor J. Turowski, the main promoter of the Workshop. It will be just the October 30 during the ARWtr2007 Dinner, since Professor J. Turowski born in the City of Kowel (Poland before II World War, now Ukraine) in October 30, 1927.

The works collected for presenting at ARWtr2007 cover an interesting range of topics on transformers, where Speakers are well-known experts in transformer area. The Speakers are strongly involved either with leading transformer work factories or strong utilities and electricity companies.

Therefore, the organisers wish all participants fruitful debates at the Workshop as well a pleasant stay in Baiona.

The ARWtr2007 Directors do hope that participants will successfully exchange their practical knowledge and find common interest for establishing links of collaboration.

ARWtr2007 SCHEDULE

	Sunday 28	Monday 29	Tuesday 30	Wednesday 31
8:00 – 8:30		Registration		
8:30 – 9:00				
9:00 – 9:30		Opening Session	<i>Lecture 5 – Oliva-ABB</i>	<i>Lecture 15- Torres-REN</i>
9:30 – 10:00			<i>Lecture 6- Heinrich-WEIDMANN</i>	<i>Lecture 16- U FENOSA</i>
10:00 – 10:30		<i>Lecture 1- Penedos-REN</i>	<i>Lecture 7- Stanislaw Gubanski</i>	<i>Lecture 17- IBERDROLA</i>
10:30 – 11:00		Coffee Break	Coffee Break – Poster Session -1	Coffe Break - Poster Session -2
11:00 – 11:30		<i>Lecture 2- Boss-CIGRE</i>		
11:30 – 12:00		<i>Lecture 3- Harold Moore</i>	<i>Lecture 8- J. Turowski-EFACEC</i>	<i>Lecture 18- A.J. Kachler Ex.Dir SIEMENS</i>
12:00 – 12:30		<i>Lecture 4- Fogelberg-ABB</i>	<i>Xose M. Lopez -Fernandez</i>	
12:30 – 13:00				Conclusion & Closing Session
13:00 – 13:30		Lunch	Lunch	
13:30 – 14:00				
14:00 – 14:30			<i>Lecture 9 – Jeewan Puri</i>	Lunch
14:30 – 15:00			<i>Lecture 10- Ryzard Malewski</i>	
15:00 – 15:30			<i>Lecture 11 - EFACE-Fluidinova</i>	
15:30 – 16:00		<i>Technical visit to EFACEC transformer factory In Porto-Portugal</i>	<i>Lecture 12 - EFACE-Fluidinova</i>	
16:00 – 16:30			Coffee Break	
16:30 – 17:00			<i>Lecture 13- E. Lesniewska</i>	
17:00 – 17:30			<i>Lecture 14- S.V. Kulkarni</i>	
17:30 – 18:00	Registration			
18:00 –				
19:30 –	Welcome Spanish Wine Parador de Baiona	Tasting Porto Wine Dinner Taylors Caves	ARWtr2007 Dinner Sea Food Party 80th Prof. Turowski's birday	

Opening Session

Fernando Xabier Blanco Alvarez - Minister of I+D+i Galician Autonomous Government -Spain
 Fernando Soto - Chairman of CIGRE Spanish National Committee-Spain
 José Penedos - Chairman of CIGRE Portuguese National Committee-Portugal
 Alberto Gago - Rector of University of Vigo
 Xose M. López-Fernández (ARWtr-Director) University of Vigo

ARWtr2007 LECTURES

Lecture 1- Chairman: Fernando Soto (REE – Red Eléctrica de España & Chairman of CIGRE Spanish National Committee-Spain)

**** Infrastructure of Electrical Power Transportation Network**

José PENEDOS

Chairman of CIGRE Portuguese National Committee-Portugal
 Executive Director of REN - Portugal
 (Rede Eléctrica Nacional- Responsible for the electricity transmission in Portugal)

Lecture 2- Chairman: Greg Anderson (Consultant, Representative and Officer of IEEE Transformers Committee- USA)

**** Presentation of CIGRE A2 “Transformers” Technical Developments and Inputs from Current Activities**

Pierre BOSS

Chairman CIGRE SC A2 ‘Transformers’
 ABB Secheron Ltd, CH 1211 Geneva 2, Switzerland
 Phone: (+41) 58 586 2368, Fax: (+41) 58 586 2019 , e-mail: pierre.boss@ch.abb.com

Lecture 3- Chairman: M. Silvestre (EFACEC Energia, Distribution and Power Transformer factory, Porto-Portugal)

**** 50-60 Year of Transformer Engineering and a Perspective of the Furture**

Harold MOORE

Transformer Consultant
 Harold Moore and Associates-USA

Lecture 4- Chairman: M. Silvestre (EFACEC Energia, Distribution and Power Transformer factory, Porto-Portugal)

**** Reliability of Power Transformers - Important Aspects to Drive the Industry to Focus on Quality**

Thomas FOGELBERG

ABB Transformers
 ABB AB, SE-77180 Ludvika, Sweden
 Phone: +46 240 783460, fax: +46240 783400, email: thomas.fogelberg@se.abb.com

Lecture 5- Chairman: O. Ribeiro (REN-Secretary of CIGRE Portuguese National Committee)

**** Development, Innovation and Transformer Solutions**

Miguel OLIVA, Lorenzo PRIETO

Chairman of CIGRE A2 Spanish National Transformer Working Group
 Asea Brown Boveri S.A., Power Transformers, Escritor Conde Zamora s/n, 14004 Cordoba, Spain
 Phone: (+34) 957 469169, fax: (+34) 957 469190, e-mail: miguel.oliva@es.abb.com
 Phone: (+34) 957 469138, fax: (+34) 957 469190, e-mail: lorenzo.prieto@es.abb.com

Lecture 6- Chairman: J. C. Burgos (Deptment of Electrial Engineering- Universidad Carlos III de Madrid, Spain)

**** Laminated Pressboard and Laminated Wood Products in Power Transformers**

Bernhard HEINRICH, Hans Peter GASSER, Christoph KRAUSE

Weidmann Electrical Technology AG
 Neue Jonastrasse 60, CH-8640 Rapperswil-Jona, Switzerland
 Phone: +41(0)55 221 44 09, fax: +41(0)55 222 84 46, e-mail: bernhard.heinrich@wico.com

Lecture 7- Chairman: D. Angell (National Grid, USA)

**** Reliable Diagnostics of HV Transformers Insulation for Safety Assurance of Power Transmission System. REDIATool - an European Research Project.**

Stanislaw M. GUBANSKI

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 Chalmers University of Technology
 412 96 Gothenburg, Sweden
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Lecture 8- Chairman: E. Ramaswamy (Design & Technology, Transformer Division, Crompton Greaves, Mumbai, India)

**** Stray Losses Control in Core and Shell Type Transformers.
Upgrading of Energy-Saving and Reliability of Large Transformers**

J. Turowski*, Xose M. Lopez-Fernandez**, A. Soto-Rodriguez, D. Souto-Revenga***

* Dept. of Intelligent Information Systems, WSHE – Lodz Poland, consultant for University of Vigo Spain, turowski@p.lodz.pl

** Dep. of Electrical Engineering, University of Vigo- Spain, xmlopez@ieee.org

***EFACEC Transformer Works, Porto –Portugal , andrea.soto@efacec.pt; david.revenga@efacec.pt

Lecture 9- Chairman: Eng. I. Sitar (KONCAR- Distribution and Special Transformers, Zagreb, Croatia)

**** Sources, Measurement and Mitigation of Sound Levels in Transformers**

Jeewan PURI

Chair of Audible Sound and Vibration IEEE Subcommittee

Transformer Solution, Inc

6700 Tree Hill Road, Matthews, NC 28104

Phone: 704 821 6638

E-mail: manopuri@worldnet.att.net

Lecture 10- Chairman: C. Gonzalez-Patiño (REE- Red Eléctrica de España)

**** Detection of Transformer Winding Displacement Using Frequency Response Analysis Method (FRA)**

Ryszard MALEWSKI

Malewski Electric Inc. Montréal, Qué. Canada

Phone: +4822 8490522, E-mail: malewski@ieee.org

Lecture 11- Chairman: Z. Cheng (R &D Center of Baoding Tianwei Group Co., Ltd, China)

**** Large Power Transformer Cooling – Flow Simulation and PIV analysis in an Experimental Prototype**

Paulo J. Gomes^{1,3}, Renato G. Sousa¹, Madalena M. Dias³, José C.B. Lopes^{1,3,*}
Manuel Silvestre², Duarte Couto², Paulo Mesquita²

¹ Fluidinova, Engenharia de Fluidos S.A., TecMaia - Rua Engenheiro Frederico Ulrich, 2650, 4470-605 Moreira da Maia, Portugal

² EFACEC – Energia, Máquinas e Equipamentos Eléctricos, S.A., P.O.Box 1018 – 4466-952 S. Mamede de Infesta, Portugal

³ Laboratory of Separation and Reaction Engineering, Dept. of Chemical Engineering, Faculdade de Engenharia da Universidade do Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal

Lecture 12- Chairman : Z. Cheng (R &D Center of Baoding Tianwei Group Co., Ltd, China)

**** Studies in a Large Power Transformer – Heat Transfer and Flow Optimization using CFD**

Paulo J. Gomes^{1,3}, Renato G. Sousa¹, Joana I. Cardoso¹, Madalena M. Dias³, José C.B. Lopes^{1,3,*}
Manuel Silvestre², Duarte Couto², Jácomo Ramos², Paulo Mesquita², Mário Maia²

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Lecture 13- Chairman: Adolfo Ibero (ARTECHE, Instrument Transformers, Bilbao, Spain)

**** Improvement of Transient State Parameters of Protective Current Transformers**

Elzbieta LESNIEWSKA and Wieslaw JALMUZNY

Department of Applied Electrical Engineering & Instrument Transformers, Technical University of Lodz,

ul. Stefanowskiego 18/22, 90-924 Lodz, Poland

Phone: (+4842) 6312694, fax: (+4842) 6372030, e-mail: elalesni@p.lodz.pl

Lecture 14- Chairman: B. Grzesik (Silesian University of Technology, Poland)

**** Coupled Field Computation for Analysis of Intricate Phenomena in Transformers**

S. V. KULKARNI

Department of Electrical Engineering, Indian Institute of Technology-Bombay

Powai, Mumbai – 400076, INDIA

Phone: (+91) 22 2576 7430, Fax: (+91) 22 2572 3707, E-mail: svk@ee.iitb.ac.in

Lecture 15- Chairman: H. Hoffmann (WEIDMAN Electrical Technology AG, Rapperswil, Switzerland)

Techniques for Power Transformer Maintenance and Refurbishing Life Cycle Extension

Jorge F. MARTINS

Substations Maintenance Department – Operation Division, REN – Rede Eléctrica Nacional, SA

Rua Casal dos Mogos – Vermoim, 4470-259 Maia, Portugal

Phone: (+351) 220011600, fax: (+351) 220011610, e-mail: jorgefilipe.martins@ren.pt

Lecture 16- Chairman: R. Rajchert (Zakłady POLCONTACT, Warszawa, Poland)

**** Quality assurance for Power Transformers. The point of view of a Utility**

Ernesto Pérez-Moreno ,Eduardo Iraburu, Joaquin Gortázar

Department of HV Equipment Quality Assurance, UNION FENOSA DISTRIBUCION

C/ Antonio Lopez, 193, 28026 Madrid, Spain

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e-mail: eperez@unionfenosa.es, eiraburu@unionfenosa.es, jmgortazar@unionfenosa.es

Lecture 17- Chairman: J.C. Carneiro (CPFL – Companhia Paulista de Força e Luz, Campinas- São Paulo, Brazil)

**** Improvement in Reliability of Power Transformers base on Changes in Specification**

Hugo Gago García hgago@iberdrola.es - Julian Vadillo Iturrioz julian.vadillo@iberdrola.es

Emilio Sierra Gomez emilio.sierra@iberdrola.es

Iberdrola Distribución, Spain

Angel Fernández Alvarez afa@iberinco.com - Rafael Adobes Golfe raq@iberinco.com

Iberinco, Spain

Lecture 18- Chairman: A. Bass (Zaporozh Transformator, Ukraine)

**** Necessities for Power Transformer Operation and Maintenance for Successful Life Management**

Part 1: The Theory and the Tools

Part 2: Practical Experience

A.J. Kachler

Ex-Director of SIEMENS Distribution and Power Transformers

Transformer Consultant for Testing - QM and Diagnostic

Lindeäckerweg 8, D 90455 Nuremberg, Germany

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ARWtr2007 POSTER PAPERS

Chairmen: Emilio Palazuelos Berto (IBERDROLA) and Eduardo Iraburu (UNION FENOSA)

POSTER SESSION – 1

1. Policy for Renewal of Electrical System Substations Silicon-Carbide (SiC) Surge Arresters considered Power Transformers Life Guard: a technical - economical vision

João Carlos Carneiro

Department of Planning and Engineering, CPFL – Companhia Paulista de Força e Luz

Campinas - Mogi Mirim Road, km 2.5; No. 1755; Postal Code 13088-900

Campinas – Sao Paulo – Brazil; Phone: + 55 19 3756 8529, e-mail: carneiro@cpfl.com.br

2. Guidelines for the Implementation of Condition Monitoring Systems in Power Transformers

Juan L. VELÁSQUEZ CONTRERAS, Roberto VILLAFÁFILA, Pau LLORET, Lluís MOLAS

Centre of Technological Innovation in Static Converters and Drives (CITCEA-UPC), Department of Electrical Engineering, Polytechnic University of Catalonia, EU d'Enginyeria Tècnica Industrial de Barcelona, Comte d'Urgell, 187. 08036 Barcelona, Spain.

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Samuel GALCERAN

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Email: galceran@citcea.upc.edu

3. Off-line and On-line diagnosis methods for power transformer on load tap changers

Edwin Rivas^{1,2}, Juan C. Burgos¹, Juan C. García-Prada³

¹Department of Electrical Engineering, ³Department of Mechanical Engineering, E.P.S University Carlos III de Madrid

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² Engineering Faculty - University Distrital Francisco José de Caldas , Carrera 7 No 40-53 Bogotá-Colombia

Phone.:5713239300 e-mail: erivas@udistrital.edu.co

4. On Line measurements of the Frequency Response of the Transformer by means of the Bushing Tap Coupler

C. González⁽¹⁾, J. Pleite⁽¹⁾, J. Sanz⁽²⁾, V. Valdivia⁽¹⁾

(1) Department of Electronic Technology, (2) Department of Electrical Engineering, University Carlos III de Madrid

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Phone: (+34) 91 6248806, fax: (+34) 91 6249430, e-mail: cagonzal@ing.uc3m.es – pleite@ing.uc3m.es

5. Medium Frequency Current Transformers in the Electrical Power Industry

Ryszard Nowicz

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ul. Stefanowskiego 18/22, 90-924 Łódź, POLAND, e-mail: s-k23-1@adm.p.lodz.pl

Regina Rajchert

POLCONTACT Warszawa Ltd., ul. Goździków 26, 04-232 Warszawa, POLAND, e-mail: rr@polcontact-warszawa.pl

6. The megahertz transformer for power applications

Mariusz Stepien¹ Boguslaw Grzesik²

The Silesian University of Technology, Department of Power Electronics, Electrical Drives and Robotics

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E-mail: ¹ mariusz.stepien@polsl.pl; ² boguslaw.grzesik@polsl.pl

7. Radio Channel Acoustic Recorders of the Discharge Processes in the Insulation of Current Transformers

Otmorskiy S.G., Pershina N.F., Roschupkin M.D., Tsvetaev S.K.

ARETECH SOLUTIONS,

C/ Cronos, 63, 1º 4, 28037 – Madrid, Tlf. +34.91.304.73.90, Fax. +34.91.304.93.47, <http://www.aretchsolutions.com>

Chairmen: J. Pleite (Universidad Carlos III de Madrid, Spain) and Ryszard Nowicz (Technical University of Lodz, Poland)

POSTER SESSION – 2

8. Seismic Response Analysis Of Power Transformer By FEA

AD Shendge, Sr. Design Manager,

Vijai Electricals Ltd, Engineering Department; Power Transformer Division, , Rudraram Village, Patancheru Mandal, Medak District, Hyderabad 502329, India, e-mail: appaso_shendge@yahoo.com & appaso.shendge@vijai.co.in

9. Transfer Function Selection for Network Realization

G.Joginadham

H.A.Mangalvedekar

VJTI-Siemens-AICTE High Voltage Laboratory, Department of Electrical Engineering, V. J. Tech. Institute,

Matunga, Mumbai- 400 019, India. Phone: (+22) 24198172, Fax: (+22) 24158174., e-mail: santoshj_g@rediffmail.com, ham_viti@yahoo.com

10. An Analytical Estimation Of Additional Losses In Generator Transformer Due To Core Circulating Current

E.Ramaswamy*, S.Saravanan, I.B.Makwana, V.S.Joshi, A.Venkatasami

Transformer Division, Crompton Greaves Ltd, Mumbai-400042, India , *pradeep.ramaswamy@cgl.co.in

11. On Stray-Field Loss in Structural Parts of Power Transformers

Zhiguang Cheng¹, **Qifan Hu**¹, **Norio Takahashi**², **Shuo Liu**³, **Junjie Zhang**¹, **Lanrong Liu**¹,
Yana Fan¹, **Jianmin Wang**¹, **Yong Du**¹, and **Xian Zhang**¹

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³ Department of Electrical and Computer Engineering, Florida International University, Miami, FL 33174, USA, Email: lius@fiu.edu

12. Usage of Passive Industrial Frequency Magnetic-Field Shielding for Losses Mitigation: A Simulation Approach

Bogdan Cranganu-Cretu¹, **Jasmin Smajic**¹ and **Giovanni Testin**²

¹ABB Switzerland AG, Corporate Research, Segelhofstrasse 1k, CH-5405 Baden 5 Daettwil, Switzerland

bogdan.cranganu-cretu@ch.abb.com, ²ABB T&D S.P.A., Viale Dell'industria, 18 IT-20010 Vittuone (MI), Italy

13. Proposal of Laminated Core Loss Model

Zhiguang Cheng, Qifan Hu, Cuiping Jiao,

Junjie Zhang, Jianmin Wang, Yong Du, Xian Zhang, Yana Fan, and Lianrong Liu

EMLAB, R & D Center, Baoding Tianwei Group Co., LTD, Tianwei West Road 2222, Baoding 071056, China

Email: emlab@btw.cn, Tel & Fax: +86-312-3308363

14. HTS transformer with improved utilization of superconducting wire

Boguslaw GRZESIK, Mariusz STEPIEN

Department of Power Electronics, Electrical Drives and Robotics, Silesian University of Technology

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Phone: (+48) 32 2371247, fax: (+48) 32 2371304, e-mail: boguslaw.grzesik@polsl.pl, mariusz.stepien@polsl.pl

15. A Novel Method for Detection of Winding Deformations Using Terminal Measurements

P. M. Joshi S. V. Kulkarni

Indian Institute of Technology, Bombay, Powai, Mumbai, 400076, INDIA, (e-mail: pmjoshi@sc.iitb.ac.in, svk@ee.iitb.ac.in)

Presentation Facilities

Lecture Sessions: Overhead and digital projector-PC will be available in the lecture session room.

Poster Sessions: For poster presentations, authors will be allocated a space of **1 m. width** (\leftrightarrow) and **1,50 m. height** ($\downarrow\uparrow$)

Social Activities/ Technical Visit to EFACEC Energia

Sunday-Oct.28 (day before): Welcome Cocktail-Spanish Wine at *Taberna la Pinta* in Parador

Monday-Oct 29 (first day): Technical visit to EFACEC Energia, Transformer Work in Porto-Portugal. After, a trip to tasting Porto Wine at the Old Town where a dinner will be served at Taylors Cave, from where there is an incomparable view of the river *Douro* and the Porto Old Down Town.

Tuesday-Octo.30: A see food dinner for commemorating the 80th birthday of Professor Janusz Turowski will be served at *Restaurante el Tunel* in Baiona. It is a traditional restaurant devoted to Galician sea food both fish and well-known Galician shellfish. It is in an exceptional situation of the first line of the Old Town, one of the touristy hot spot in Baiona.

Technical/Commercial Exhibition

During Workshop days there will be the following exhibitors:

- EFACEC Energy
- KELMAN Ltd
- ARETECH SOLUTION S.A.
- CEDRAT
- INDIELEC

Sponsors



This Programme is dated 7.10.07 and available in the ARWtr2007 Web-site:

<http://webs.uvigo.es/arwtr2007>

In any case of mistake or improvements to be introduced, please do not hesitate to inform ARWtr2007 Organising Secretariat:

arwtr2007@uvigo.es