



LABORATÓRIO NACIONAL
DE ENGENHARIA CIVIL



IBRACON
Instituto Brasileiro de Concreto



Second International Dam World Conference

PORTUGAL • LISBON • LNEC
April 21-24, 2015

Programme

Organized by



LABORATÓRIO NACIONAL
DE ENGENHARIA CIVIL



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TEREZINHA Espósito, Brazil

Welcome message

Welcome to the second edition of the International DAM WORLD Conference.

This is the second international conference of the series to be convened by the National Laboratory for Civil Engineering (LNEC) and IBRACON - Brazilian Institute for Concrete - after the first one that took place in Maceió, Brazil, in 2012.

Demand for water and energy is steadily increasing throughout the world. In many regions, water and energy availability is critical to any further development above the present unsatisfactorily low level, and even to the mere survival of existing communities or to meet the continuously growing demand originated from the rapid increase of their population and from their quality of life expectations. In these regions we cannot disclaim the contribution to be made by dams and reservoirs.

The aim of Dam World Conference series is to bring together dam experts from all over the world concerned with the scientific and practical challenges of dam engineering. About 40 countries were represented in the Conference. A total of 116 abstracts were submitted and 94 papers were accepted by the Scientific Committee for publication and presentation. The authors come from a variety of backgrounds and the papers cover a wide range of topics related to dam engineering. The interest and the participation on this conference show the renewed importance of dams all over the world, highlighting its contribution to a global sustainable development.

The Proceedings are published in two volumes, the complete papers in digital support, and a book abstracts.

The Conference Organisation members would like to acknowledge their appreciation to the authors of these papers for their effort in submitting and preparing their contributions, specially for their willingness to share their research accomplishments. We would like also to express our sincere gratitude to the members of the Scientific Committee who carefully reviewed the papers included in the Proceedings.

Carlos Pina, Conference Chair

General Information

Venue

The Conference will be held at:
Laboratório Nacional de Engenharia Civil (LNEC)
Av. do Brasil 101, 1700-066 Lisboa, Portugal
Tel: +351 21 844 33 61
Fax: +351 21 844 30 26
<http://www.lnec.pt>
LNEC is located near the city center and close to Lisbon Airport.

Language

English is the official language of the Conference.

Session recording

All sessions held in the Auditorium will be recorded.

Internet

Free access to LNEC's wireless network in the congress center area (select: **guest_lnec**).

Car park

Car park is available at LNEC Campus to all participants during all Conference events.

Coffee breaks

During the session breaks, drinks are going to be served in the Congress Hall.

Exhibitors

- 1 EDP
- 2 CARPI TECH B.V.
- 3 AQUALOGUS - ENGENHARIA E AMBIENTE, LDA.
- 4 GSE Lining Technology GmbH
- 5 CIMPOR

Lunch

Lunches will be served near LNEC's Congress Centre, in Cuama Pavillion.

Transportation

Buses will be available to the Conference Banquet and to the Technical Visit.

Mobile phones

It's forbidden the use of mobile phones in the rooms of the Conference.

Delegates identification

Delegates must use the identification tags during all events of the Conference.

Taxis

- Retális: 21 811 90 00
- Autocoope: 21 793 27 56
- Rádio Táxis: 21 936 21 13
- Teletáxis: 21 811 11 00

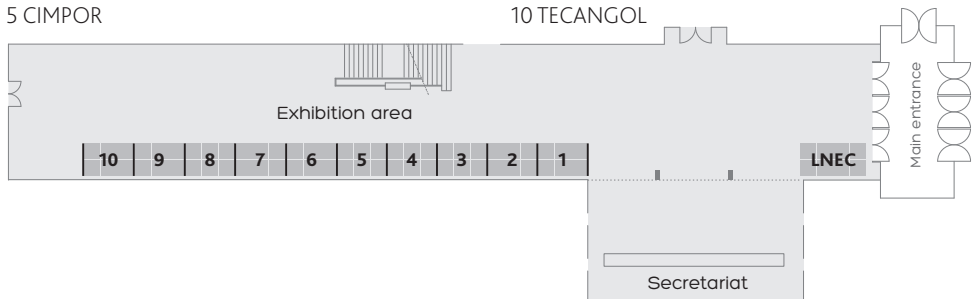
BUS

731, 783, 744, 717

Subway

Alvalade (700m)

- 6 WORTHINGTON PRODUCTS, INC.
- 7 Geokon, Inc./CÊGÊ
- 8 JEENE
- 9 COBA
- 10 TECANGOL



Conference Themes

Main Themes

- T1 - Concrete and Masonry Dams
- T2 - Embankment Dams
- T3 - Appurtenant Works
- T4 - Tailing Dams
- T5 - Environmental Issues
- T6 - Finance and Economic Aspects
- T7 - Regulation

Topics

- ST1 - Roller Compacted Concrete Dams
- ST2 - Concrete Face Rockfill Dams
- ST3 - Methods of Analysis and Design of Dams
- ST4 - Dam Foundation
- ST5 - Seismic Analysis
- ST6 - Stability of Dams and Slopes
- ST7 - Dam Monitoring and Instrumentation
- ST8 - Safety Assessment
- ST9 - Operation and Maintenance
- ST10 - Rehabilitation and Dam Heightening
- ST11 - Concrete Swelling Processes
- ST12 - Risk Assessment
- ST13 - Warning Systems
- ST14 - Geomembranes for dams
- ST15 - Dam Management Systems
- ST16 - Design Innovation
- ST17 - Modelling and Testing
- ST18 - New Materials for Dams
- ST19 - Small Dams
- ST20 - Joint / Interface Problems at Concrete Dams
- ST21 - Sedimentation in Reservoirs and Related Problems
- ST22 - Decommissioning of Dams

Opening Ceremony

Auditorium - 21 April, 09h00

Plenary Session

Auditorium - 21 April, 09h30

Forum on Dam Safety

Chair Satoru Ueda | Co-chair Laura Caldeira

KEYNOTE

Satoru Ueda

USA

DEVELOPMENT AND ENHANCEMENT OF DAM SAFETY FRAMEWORK

José Rocha Afonso, J. O. Pedro and Laura Caldeira

Portugal

REVISION OF THE PORTUGUESE DAM SAFETY REGULATIONS

Carlos Motta Nunes and Josimar A. Oliveira

Brazil

5 YEARS OF IMPLEMENTATION OF THE BRAZILIAN DAM SAFETY ACT: A CRITICAL REVIEW

Jesica T. Castillo-Rodríguez, Adrián Morales-Torres and Ignacio Escuder-Bueno

Spain

A RISK-INFORMED JOURNEY TOWARDS IMPROVED DAM SAFETY GOVERNANCE IN SPAIN

Parallel Session 1

Auditorium - 21 April, 11h30

Open Forum Discussion on Dam Safety

Chair Carlos Motta Nunes | Co-chair Eliane Portela

António Pinheiro, José Mora Ramos, Laura Caldeira, António Lopes Batista, Eduardo Jossefa and Ângelo

Boavida

Portugal / Mozambique

PROPOSAL FOR THE DAM SAFETY REGULATION OF MOZAMBIQUE

Vitor Camilo, Alberto Rodrigues da Silva, **Raul Pereira da Costa**, José Barateiro, Eliane Portela and **João**

Fonseca

Angola / Portugal

TOWARDS A DAMS SAFETY MANAGEMENT SYSTEM FOR ANGOLA

Eliane Portela, José Barateiro, Lígia Araujo, André Onzi, Nuno Charneca, Alexandre Anderãos, Fernanda

Aquino, Alexis Massenet and Paula Freitas

Portugal / Brazil

THE BRAZILIAN NATIONAL DAM SAFETY INFORMATION SYSTEM (SNISB)

Sergio Salgado, Marcus Oliveira, Eduardo Passeto, Nadia Menegaz, Helber Viana, **Josimar Oliveira** and

Flávia Barros

Brazil

IMPACT OF SMALL DAMS IN BRAZIL IN COMPLIANCE WITH THE RESOLUTIONS OF DAM SAFETY PUBLISHED BY THE BRAZILIAN NATIONAL WATER AGENCY (ANA)

Round Table

Chair Erwin De Nys

Participants: Satoru Ueda (USA), José Rocha Afonso (Portugal), Carlos Motta Nunes (Brasil) e Jesica Castillo (Espanha), Manuel Quintino (Angola)

Parallel Session 2

Small Auditorium - 21 April, 11h30

Special Session on Concrete Face Rockfill Dams I

Chair Manoel Sousa Freitas | Co-chair João Marcelino

KEYNOTE

Bayardo Materón *Brazil*
EVOLUTION OF ZONING FOR THE CONCRETE FACE ROCKFILL DAMS (CFRD'S RELATED TO THE EXISTANCE OF LOCAL MATERIALS)

Chair Bayardo Materón | Co-chair Ricardo Santos

Hans-Martin Leitner, Markus Verdianz and Ilhan Bora *Austria*
DESIGN AND CONSTRUCTION OF KAVSAK BENDI CFRD

R. K. Gupta, R. K. Agrawal and Jaganniwas *India*
STUNG TASAL DAM PROJECT, COMBODIA CONCRETE FACED ROCK FILL DAM WITH BITUMEN SHEET IN EXPOSE CONDITION AS WATER BARRIERS IN FACE SLAB JOINTS

Belkacem Moussai *Algeria*
NUMERICAL PREDICTION OF THE FACE SLAB DEFORMATION OF A CONCRETE FACE ROCKFILL DAM

Plenary Session

Auditorium - 21 April, 14h00

Chair Carlos Henrique Medeiros | Co-chair Laura Caldeira

KEYNOTE

Vahid Afsari-Rad *Norway*
ASPHALT CONCRETE CORES FOR EMBANKMENT DAMS (ACED)

Parallel Session 3 Concrete Dams I

Auditorium - 21 April, 14h30

Chair Domingos Silva Matos | Co-chair António Lopes Batista

KEYNOTE

Francisco Ortega *Germany*
IMMERSION VIBRATED RCC. CLOSING THE LOOP BETWEEN CONVENTIONAL AND ROLLER-COMPACTED CONCRETE DAMS

Chair Francisco Ortega | Co-chair José Piteira Gomes

Marco Neves, Jorge Sousa Cruz and António Sobral Rodrigues *Portugal*
CHAFROU HARDFILL DAM: A NEW CONCEPT FOR RCC

Esperanza Menéndez, Ricardo García-Rovés and Nicanor Prendes *Spain*
DAMAGE ASSESSMENT OF DAMS AFFECTED EXPANSIVE REACTIONS USING STEREOMICROSCOPY AND ELECTRON MICROSCOPY. RELATIONSHIP BETWEEN THE DAMAGE LEVELS DRI AND DL

Dora Soares, António Santos Silva, José Mirão, Violeta Ramos, Isabel Fernandes and Esperanza Menéndez *Portugal*
ASSESSMENT OF ALKALIS RELEASED BY AGGREGATES. CONTRIBUTION TO THE ALKALINITY INCREASE AND AAR DEVELOPMENT IN CONCRETE

António Santos Silva, Dora Soares, Isabel Fernandes, Violeta Ramos and Sara Leal *Portugal*
IMPROVEMENT IN THE CHARACTERIZATION OF AGGREGATES OF SLOWLY ALKALI REACTIVITY

Manuel Vieira, Bettencourt Ribeiro, Armando Camelo and Emanuel Costa Portugal
PAC – AN OPTION FOR MASS CONCRETE STRUCTURES CONSTRUCTION

Ahmad Shayan and Norm Cribbin Australia
CONCRETE DURABILITY INVESTIGATION OF A MAJOR HYDROELECTRIC ARCH DAM

Parallel Session 4 Small Auditorium - 21 April, 14h30

Special Session on Concrete Face Rockfill Dams II

Chair Mateus de Brito | Co-chair João Manso

Ebrahim Mokhtarpour, **Paulo T. Cruz** and *Fernando A.M. Marinho* Brazil
BEHAVIOUR OF EXTRA HIGH CONCRETE FACE ROCKFILL DAM IN FIRST FILLING
IMPOUNDING - CASE STUDY 315 M

Ebrahim Mokhtarpour, **Paulo T. Cruz** and *Fernando A.M. Marinho* Brazil
PREDICTION OF ZONE 3B'S DISPLACEMENT ON EXTRA HIGH CONCRETE FACE ROCKFILL
DAM IN END OF CONSTRUCTION - CASE STUDY 315 M

Luís Ribeirinho, *Gonçalo Tavares*, *Manuel Romeiro*, *Mário Samora*, *José Mateus de Brito*, *João Marcelino*,
José António Boal Paixão and *José Cordeiro* Portugal
DESIGN OF MONTESINHO DAM AND EMBANKMENT MONITORING DURING
CONSTRUCTION

João Marcelino, *André Serrano*, **João Manso** and *José Boal Paixão* Portugal
3D ANALYSIS OF MONTESINHO CFRD USING CODE-ASTER FEM PROGRAM

Parallel Session 5 Auditorium - 21 April, 16h30

Concrete Dams II

Chair José Marques Filho | Co-chair Luísa Braga Farinha

Simon-Nicolas Roth, *Alexandre Lacombe*, **Pierre Léger** and *Azzedine Soulaïmaini* Canada
COUPLED HYDRO-MECHANICAL CRACKING OF CONCRETE ARCH DAMS CONSIDERING
DRAINAGE EFFICIENCY

Nuno Azevedo and *Marilene Candeias* Portugal
A 2D DISCRETE PARTICLE MODEL FOR CONCRETE GRAVITY DAMS FAILURE SCENARIOS
ANALYSIS

Nuno Azevedo and *Romano Câmara* Portugal
DYNAMIC ANALYSIS OF CONCRETE DAMS: FLUID STRUCTURE DISPLACEMENT BASED
INTERACTION MODELS

Rikard Hellgren and *Tobias Gasch* Sweden
INFLUENCE OF FLUID STRUCTURE INTERACTION ON A CONCRETE DAM DURING SEISMIC
EXCITATION

Bernhard Mayer and *Miroslav Marenc* Austria
IMPROVING THE SEISMIC STABILITY OF GRAVITY DAMS BY CURVING THE LAYOUT

Ivo Dias, *Xavier Oliver*, *J.V. Lemos* and *Oriol Lloberas-Valls* Portugal
ADVANCED NUMERICAL TECHNIQUES FOR MODELING TENSILE CRACK PROPAGATION IN
GRAVITY DAMS

Renato Pereira, António L. Batista and Luís C. Neves

Portugal

SAFETY EVALUATION OF CONCRETE GRAVITY DAMS SLIDING CONSIDERING THE VARIABILITY OF ROCK MASS FOUNDATION HYDRAULIC AND MECHANICAL PROPERTIES

Parallel Session 6

Small Auditorium - 21 April, 16h30

Embankment Dams

Chair Terezinha Espósito | Co-chair João Bilé Serra

Ricardo Correia dos Santos, Laura Caldeira, and Emanuel Maranha das Neves

Portugal

LABORATORY STUDY ON THE SUFFUSION BEHAVIOUR OF COARSE GAP-GRADED SOILS FOR USE AS POTENTIAL UPSTREAM CRACK FILLERS IN ZONED DAMS

Vanda Malveira, Francisco Gomes and Fernanda Furtado

Brazil

VALIDATION OF GEOTECHNICAL STRENGTH PARAMETERS APPLIED TO A DAMAGED DAM

Paulo T. Cruz, Bayardo Materón and Manoel Sousa Freitas Jr.

Brazil

FLOW OF WATER THROUGH DAMS AND FOUNDATIONS

Francesco Federico and Marco Iannucci

Italy

ANALYSIS OF PARTICLE MIGRATION PHENOMENA AFFECTING SOME EMBANKMENT DAMS MATERIALS

Pierre-Yves Hicher, Yinfu Jin, Christophe Dano and Zhenyu Yin

France

A CONSTITUTIVE MODEL FOR ROCKFILLS CONSIDERING GRAIN BREAKAGE AND SIZE EFFECT

Carolina Flórez, Maria Claudia Barbosa, **Terezinha Espósito** and Julia Gomes Pinto Carapiá

Brazil

PHYSICAL AND CHEMICAL PROPERTIES OF IRON MINING TAILINGS

António Veiga Pinto and Filipa Sousa

Portugal

THE FUTURE HYDROELECTRIC POWER DAMS IN PORTUGAL:AN ANALYSIS IN VIEW DAM CONSTRUCTION GLOBAL TREND

Plenary Session

Auditorium - 22 April, 09h00

Chair José Polimón | Co-chair António Tavares de Castro

KEYNOTE

José Marques Filho

Brazil

DURABILITY AND PATHOLOGICAL MANIFESTATIONS IN CONCRETE HYDRAULIC STRUCTURES IN BRAZIL

ICOLD Presentation

Auditorium - 22 April, 09h30

José Polimón

Spain

Young Professionals Workshop

Auditorium - 22 April, 09h40

Chair José Mora Ramos | Co-chair Ivo Dias

KEYNOTE

José Polimón

Spain

TRAINING DAM PROFESSIONALS TO CLOSE THE DOUBLE GAP (KNOWLEDGE AND GENERATIONAL)

Graphical Posters

Chair José Polimón | Co-chairs José Mora Ramos, Ivo Dias and Ricardo Santos

- Tanil Arkış** Turkey
EXPERIMENTAL AND NUMERICAL INVESTIGATION OF FLOOD PROPAGATION DUE TO TRAPEZOIDAL BREACH IN THE DISTORTED PHYSICAL MODEL OF ÜRKMEZ DAM
- Andrea Brito** Portugal
USE OF SOIL-ROCKFILL MIXTURES (SRM) IN EMBANKMENT DAMS
- António Muralha** Portugal
CANIÇADA DAM COMPLEMENTARY SPILLWAY: PHYSICAL MODEL HYDRAULIC TESTS
- Jesica Castillo-Rodríguez** Spain
TOWARDS AN INTEGRATED FRAMEWORK FOR MULTI-HAZARD FLOOD RISK ASSESSMENT: INCLUDING FAILURE OF DAMS AND OTHER FLOOD DEFENSE INFRASTRUCTURES
- Emílio Santos** Brazil
DAM MANAGEMENT SYSTEM MODEL BASED ON CONTINUAL IMPROVEMENT PROCESS
- Ricardo Santos** Portugal
LIMITATION OF THE PROGRESSION OF INTERNAL EROSION IN ZONED DAMS
- Carlos Serra** Portugal
EXPERIMENTAL CHARACTERIZATION AND NUMERICAL MODELING OF DAM CONCRETE RHEOLOGICAL PROPERTIES
- Miguel Silva** Portugal
COMPLEMENTARY SPILLWAY OF SALAMONDE DAM. 3D NUMERICAL MODELLING VALIDATED WITH PHYSICAL MODEL RESULTS

Parallel Session 7

Auditorium - 22 April, 11h30

Concrete Dams III

Chair Pierre Léger | Co-chair Nuno Azevedo

- Frédéric Dufour, Maxime Tatin, Alexandre Simon, Matthieu Briffaut and Jean-Paul Fabre** France
THERMAL DISPLACEMENTS OF CONCRETE DAMS: ACCOUNTING FOR WATER TEMPERATURE PROFILE IN STATISTICAL MODEL
- Marius Bühlmann, Marco Gerber, David Vetsch, Robert M. Boes** Switzerland
DAM BEHAVIOUR ANALYSIS WITH THE DAMBASE SOFTWARE
- Ricardo Pimentel, João Gomes Cunha, Joaquim Figueiras, C. Rodrigues, António Tavares de Castro and Noemi Leitão** Portugal
EXPERIENCE ACQUIRED WITH THE APPLICATION OF NOVEL FIBER OPTIC TRANSDUCERS TO THE ALTO CEIRA II DAM
- Noemi Leitão, António Tavares de Castro and João Cunha** Portugal
ANALYSIS OF THE OBSERVED BEHAVIOUR OF ALTO CEIRA II DAM DURING THE FIRST FILLING OF THE RESERVOIR
- Eloisa Castilho, Noemi Leitão and Carlos Fernandes** Portugal
THERMAL ANALYSIS OF CONCRETE DAMS DURING CONSTRUCTION PHASE
- Sérgio Oliveira, André Silvestre, Margarida Espada, Patrícia Salvado and Romano Câmara** Portugal
MONITORING THE DYNAMIC BEHAVIOR OF CABRIL DAM

Anthony Simmonds

USA

VIBRATING WIRE SENSORS FOR LONG TERM MONITORING OF DAMS

Parallel Session 8

Small Auditorium - 22 April, 11h30

Embankment Dams and Geomembranes

Chair Vahid Afsari-Rad | Co-chair Andrea Brito

Jose Nuno Lima, Vasco Conde and Henrique Candeias

Portugal

QUALITY ASSESSMENT OF GNSS WITH SHORT-LENGTH SESSION IN THE DISPLACEMENT MEASUREMENT OF A LARGE EMBANKMENT DAM

Rui Costa, Jorge Sousa Cruz and António Sobral Rodrigues

Portugal

GEOLOGICAL AND GEOTECHNICAL STUDIES FOR THE CHERTIOUA DAM PROJECT – ALGERIA

Wan-Huan Zhou and Xu Xu

Macau

COMPARISON STUDY BETWEEN MEASURED AND PREDICTED VALUES OF SHEAR STRENGTH FOR UNSATURATED COMPLETELY DECOMPOSED GRANITE SOIL

Sonja Gamse and Michael Oberguggenberger

Austria

ASSESSMENT OF LONG TERM GEODETIC OBSERVATIONS ON EMBANKMENT DAM

María Sierra

Colombia

GEOTECHNICAL PROCEDURE FOR DESIGN OF ITUANGO EARTH CORE ROCKFILL DAM

María Sierra and Luis Cárdenas

Colombia

LABORATORY AND FIELD ROCKFILL DEFORMATION MODULUS ESTIMATES

Alberto Scuero, Gabriella Vaschetti, **Giovanna Lilliu**

Switzerland

GEOMEMBRANE SYSTEMS IN PUMPED STORAGE SCHEMES: CARPI EXPERIENCE

Plenary Session

Auditorium - 22 April, 14h00

Chair Túlio Bittencourt | Co-chair José Muralha

Manuel Pinho de Miranda

Portugal

PORTUGUESE HYDROELECTRIC DEVELOPMENTS. CURRENT TRENDS OF STRUCTURAL SAFETY CONTROL

Announcement: ICOLD 25th Congress/ ICOLD 83rd Annual Meeting, Symposium Hydropower'15

Auditorium - 22 April, 14h30

Carole Rosenlund

Norway

Parallel Session 9

Small Auditorium - 22 April, 14h40

Dam Foundations

Chair Jorge Vazques | Co-chair Luís Lamas

Markus Verdianz, Selami Güven and İlhan Bora

Austria

GROUTING UNDER DIFFICULT GEOLOGICAL CONDITIONS

João Casaca and Vasco Conde

Portugal

QUANTITATIVE INTERPRETATION OF A ROCK MASS DEFORMATION MEASUREMENT

- Rogério Mota**, *Jorge Neves and Fernando Santos* Portugal
 GEOPHYSICAL METHODS APPLIED TO THE ASSESSMENT OF THE GEOLOGICAL AND
 GEOTECHNICAL CONDITIONS OF DAM SITES: THE CASE STUDY OF PEDRÓGÃO DAM
 (PORTUGAL)
- Margarida Espada** and *Luís Lamas* Portugal
 ROCK MASS BEHAVIOUR ANALYSIS OF THE SALAMONDE II POWERHOUSE
- Isabella Figueira**, *Ramon Rivas and Marcos Soares* Brazil
 GEOLOGICAL MAPPING AND FOUNDATION GEOMECHANICS CHARACTERIZATION FOR
 THE IDENTIFICATION PLACES FOR DETAILED MONITORING IN PLANTS MAINTENANCE

Parallel Session 10 Auditorium - 22 April, 14h40
Emergency Action Plan, Risk Assessment, Warning Systems
 Chair Alexius Vogel | Co-chair Teresa Viseu

- João Cunha*, **Adriano Oliveira** and *Pedro Vieira Soares* Portugal
 THE EMERGENCY ACTION PLANS OF THE BAIXO SABOR DAMS
- Dora Roque**, *Daniele Perissin, Ana Falcão, Ana Fonseca and Maria Henriques* Portugal / USA
 DAM REGIONAL SAFETY WARNING USING TIME-SERIES INSAR TECHNIQUES
- Flávio Sohler**, *José Roberto Ribas and Juliana Crenitte Ribas Severo* Brazil
 A MULTICRITERIA RISK ASSESSMENT FOR LARGE SCALE HYDROELECTRIC PLANT PROJECTS
- Alexandre Melo*, **Terezinha Espósito** and *Mauro Naghettini* Brazil
 QUALITATIVE RISK ANALISYS APPLIED TO EMBANKMENT DAMS
- C. H. de A. C. Medeiros** Brazil
 DAM SAFETY CRITERIA MUST INCLUDE RISK FACTORS NON-TECHNICAL
- Helber Viana, Eduardo Passeto*, **Josimar Oliveira**, *Flavia Barros, Sérgio Salgado, Marcus Oliveira and Nádia Menegaz* Brazil
 RISK CATEGORY CLASSIFICATION CRITERIA ESTABLISHED BY THE BRAZILIAN DAM SAFETY
 REGULATIONS APPLIED ON SMALL WATER STORAGE DAMS
- José Melo**, *Lígia Araujo, Manuel Oliveira, Tiago Martins, Márcio P. Pinto and Paula P. Freitas* Portugal / Brazil
 HAZARD POTENTIAL CLASSIFICATION OF DAMS USING A SIMPLIFIED METHODOLOGY
- Antonio Lambertini* and **Teresa Viseu** Brazil / Portugal
 DOWNSTREAM VALLEY HAZARD CLASSIFICATION OF ITABIRA MUNICIPALITY DAMS

Parallel Session 11 Auditorium - 22 April, 16h30
Concrete Dams IV
 Chair Manuel Pinho Miranda | Co-chair Jorge Pereira Gomes

- Ana Marcelino*, **José Calixto**, *Adriana Gumieri, Maria Ferreira, Marcos Silva and Anna Costa* Brazil
 A METHODOLOGY FOR TARGETING SULFUR COMPOUND LEVELS IN CONCRETES FOR
 HYDROELECTRIC DAMS
- Armando Camelo*, **Vanessa Gaspar** and *Pedro Ferreira Da Silva* Portugal
 THE CONCRETE QUALITY CONTROL IN EDP HYDROELECTRIC SCHEMES
- Carlos Serra**, *António Batista and Nuno Azevedo* Portugal
 COMPREHENSIVE ANALYSIS OF CONCRETE DEFORMABILITY TEST RESULTS OF
 PORTUGUESE LARGE DAMS

Maria Henriques and **Pedro Ramos** Portugal
THERMAL IMAGING OF CONCRETE DAM WALLS TO SUPPORT THE CONTROL OF THE
EVOLUTION OF PATHOLOGIES

Maria Henriques and **Dora Roque** Portugal
UNMANNED AERIAL VEHICLES (UAV) AS A SUPPORT TO VISUAL INSPECTIONS OF
CONCRETE DAMS

Joaquim J. M. Sousa, Milan Lazecky, Ivana Hlavacova, Matus Bakon, Gloria Patricio and Daniele Perissin
Portugal / Czech Republic / Slovakia / USA
SATELLITE SAR INTERFEROMETRY FOR MONITORING DAM DEFORMATIONS IN PORTUGAL

Juan Mata and **António Tavares de Castro** Portugal
ASSESSMENT OF STORED AUTOMATED MEASUREMENTS IN CONCRETE DAMS

João Custódio, **António Ribeiro** and **António Santos Silva** Portugal
ALKALI-AGGREGATE REACTION, AAR – DEALING WITH AAR IN LARGE CONCRETE
STRUCTURES

Parallel Session 12 Small Auditorium - 22 April, 16h30 Appurtenant Works, Environment Issues, New Materials, Management

Chair Felix Hernando | Co-chair José Falcão de Melo

M.Ş. Güney, G. Tayfur, T. Arkis, and G. Bombar Turkey
EXPERIMENTAL AND NUMERICAL INVESTIGATION OF FLOOD PROPAGATION DUE TO
TRAPEZOIDAL BREACH IN THE DISTORTED PHYSICAL MODEL OF ÜRKMEZ DAM

Elsa Alves, **Felix Hernando** and **Rafael Chacón** Portugal / Spain
DAIVÕES DAM SPILLWAY: A NOVEL SOLUTION FOR THE STILLING BASIN

Cuneyt Yavuz, Ali Ersin Dincer, Kutay Yilmaz and Samet Dursun Turkey
HEAD LOSS ESTIMATION OF WATER JETS FROM FLIP BUCKET OF ÇAKMAK-1 DIVERSION
WEIR AND HEPP

António Muralha, **Lúcia Couto**, **Manuel Oliveira**, **José Dias Silva**, **Teresa Alvarez** and **Ricardo Sardinha** Portugal
SALAMONDE DAM COMPLEMENTARY SPILLWAY. DESIGN, HYDRAULIC MODEL AND
ONGOING WORKS

Nima Tavakoli Shirazi Iran
INVESTIGATING THE VARIATION OF GEOMETRICAL PARAMETERS IN RUBBER DAMS DUE
TO CHANGES OF INTERNAL PRESSURES

Miguel Silva, **Sérgio Costa** and **António H. Cardoso** Portugal
SLIT CHECK-DAMS FOR STONY TYPE DEBRIS FLOWS MITIGATION. EXPERIMENTAL STUDY
TO EVALUATE SEDIMENT CONTROL EFFICIENCY

Dora Roque, **Ana Fonseca**, **Nuno Afonso**, **Maria Henriques** and **José Muralha** Portugal
VISUAL INSPECTION AIDED BY DIGITAL PHOTOGRAPHY: APPLICATION TO THE SLOPES OF
FOZ TUA DAM

C. Granell Ninot, **L. Mendes**, **Teresa Viseu**, **J. Granell Vicent**, **A. Duque Carrero**, **J. Ortas González**, **O. Herrero Domínguez**, **F. Rio Iglesias** and **E. Ruíz Gutiérrez** Spain / Portugal
EXPERIMENTAL AND NUMERICAL STUDY OF A CHUTE SPILLWAY

Book Signing Session

Date 21st April - 16h00

Congress Hall, next to the Exhibition area

Second Edition Release: Concrete Faced Rockfill Dams Authors: Paulo Cruz, Bayardo Materón e Manoel Freitas Book Signing

Visit to LNEC's Shaking Table and Hydraulic Lab

Date 22nd April - 9h40

Meeting point Congress Hall, next to the Secretariat

Please, register at the Secretariat until 21st April 16h30

Social Programme

Welcome cocktail

Date 20th April – 18h30-19h30

Venue LNEC Congress Centre

Accompanying Person ticket € 15,00

Lunch - Cuama Pavillion

Accompanying Person ticket € 15,00

Conference Banquet

Date 22nd April – 19h30-22h30 (buses will leave LNEC 19h00)

Venue Ópera ship (located at “Doca do Espanhol”, in Alcântara, Lisbon)

Delegates must collect their invitation at Secretariat until 22nd April, 12h00 am

Accompanying Person ticket € 65,00 (available until 22nd April, 12h00 am)

Buses will leave LNEC at 19h00 to the harbour, and they will bring participants back to main Hotels (see map).



Nautical route (3 hours)

Alcântara – Belém – Cristo-Rei – Terreiro do Paço – Santa Apolónia – Alcântara



On the 20th April, 2015 it was organised by Laboratório Nacional de Engenharia Civil two One-Day Courses and one Seminar

One-day Course 1

Internal erosion in embankment dams and foundations

Phenomenological and experimental standpoint



Course description

Internal erosion, alongside overtopping, is one of the most hazardous issues that can affect the safety of embankment dams.

Internal erosion in soils involves very complex hydromechanical phenomena, whereby a large number of factors (some of them as yet unknown in all probability) play an important role. It is thus natural that the research so far on internal erosion is predominantly of an empirical nature and experimentally based.

Over the last decades there has been a growing interest at finding ways to estimate the probability of failure by internal erosion, as a part of risk assessment for dam safety. To this end, the internal erosion process leading to dam failure is usually broken in smaller events. These are more easily understood and simpler to estimate probabilities.

This one-day course aims at improving the knowledge and understanding by the participants about the process of internal erosion in embankment dams, in a dam safety context.

The emphasis is placed on the phenomenological and experimental standpoint. The main factors influencing each step of the internal erosion process are presented. The most relevant laboratory tests/empirical studies for the study of the likelihood of occurrence of the various phenomena involved are also indicated.

Filters are the first line of defence against internal erosion. Thus, some best practices concerning the design and construction of filters are indicated.

Speakers

Emanuel Maranha das Neves, IST, Portugal

Laura Caldeira, LNEC, Portugal

Alexius Vogel, Risk Assessment International, Austria

Ricardo Correia dos Santos, LNEC, Portugal

On-day Course 2

Failure assessment and emergency preparedness of dams



Course description

Effective Emergency Action Plans (EAPs) at high hazard potential dams is a key issue to reduce loss of life and property damage from dam failure. Dam risk mitigation is achieved by increasing dam safety, reducing potential consequences of dam-break floods and improving the preparedness of dam owners and operators, dam safety managers, emergency officials and the people at risk in the downstream valley.

This one-day course is designed to provide a comprehensive understanding of the most important aspects of dam safety evaluation and failure, dam-break flood risk assessment and emergency planning. It is developed by geotechnical, structural and hydraulic experts and comprises four modules: i) risk-based dam safety evaluation; ii) risk mitigation and emergency preparedness planning; iii) detection and classification of anomalies and causes of dam failure and iv) dam-break flood risk assessment.

The purpose of the first module is to provide an overview on risk-based dam evaluation. It begins with the presentation of the lessons learned from case histories and is followed by the description of current methods and tools available for estimating the likelihood of dam failure, including fault tree construction and evaluation and Failure Mode and Effects Analysis (FMEA) method. This module ends with the presentation of methodologies to estimate consequences of dam failure, analyzing scenarios to determine dam failures and assessing potential consequences, including economic, social, institutional and environmental damages.

Speakers

João Marcelino, LNEC, Portugal

Laura Caldeira, LNEC, Portugal

Teresa Viseu, LNEC, Portugal

David Bowles, Utah State University, USA

Luisa Braga, LNEC, Portugal

João Fernandes, Laboratory of Hydraulics, Hydrology and Glaciology of the ETH Zurich, Switzerland

José Melo, LNEC, Portugal

Manuel Oliveira, LNEC, Portugal

Tiago Martins, LNEC, Portugal

Seminar

Modelling of concrete dams

Analysis of structural and foundation behaviour and safety assessment



Seminar description

Numerical modelling of concrete dams is, due to the potentially disastrous consequences associated to failure of these large structures, a very important field of application. Moreover, the structural analysis and safety assessment of concrete dams comprises a multiplicity of modelling tasks which demand from the engineer extensive knowledge on diverse fields of different phenomenological nature.

The seminar aims to address the most important topics related to the modelling of the behaviour of concrete dams and their foundations, offering to the participants the opportunity of improving their understanding and knowledge on this field, with particular reference to the recent developments of numerical techniques.

The program addresses the general aspects and design issues, the finite and discrete element methods applied to the structural analysis of dams and foundation under static and dynamic load, concrete constitutive models, monitoring of dynamic behaviour, modelling of rock mass foundation, thermal analysis, roller-compacted concrete dams, long term behaviour, swelling processes due to alkali-aggregate reactions, etc.

Speakers

Pierre Léger, E.P. Montréal, Canada
Domingos Silva Matos, EDP, Portugal
José Oliveira Pedro, Consultant, Portugal
José Vieira de Lemos, LNEC, Portugal
António Lopes Batista, LNEC, Portugal
Noemi Leitão, LNEC, Portugal
Sérgio Oliveira, LNEC, Portugal
Jorge Pereira Gomes, LNEC, Portugal
José Piteira Gomes, LNEC, Portugal
Nuno Azevedo, LNEC, Portugal
Ivo Dias, LNEC, Portugal

Venue Quinta de São Domingos, Peso da Régua

The dinner will be held in a singular *Quinta* located in the Douro demarcated region, classified by UNESCO as World Heritage.

A guided visit to the cellar, located in the *Quinta*, will present a bit about the history of the Port wine.

www.quintadesaodomingos.com/



Day 2 24th April 2015 (Friday)

08h15 Bus leaves the Hotel to Hotel in Vila Real - Peso da Régua

09h00 Douro River cruise

Lunch served on board



16h00 Transfer Pocinho - Lisbon

Publication Partners

Dam Engineering Journal



A Special Issue of the Dam Engineering Journal was published with a selection of the five Best Papers presented in the Second International DAM WORLD Conference (DW2015). The following papers were selected:

Paper title	Authors
A constitutive model for rockfills considering grain breakage and size effect	Pierre-Yves Hicher, Yinfu Jin, Christophe Dano, Zhen-Yu Yin
Coupled hydro-mechanical cracking of concrete arch dams considering drainage efficiency	Simon-Nicolas Roth, Alexandre Lacombe, Pierre Leger and Azzeddine Soulaïmani
The concrete quality control in EDP hydroelectric schemes	Armando Camelo, Vanessa Gaspar, Pedro Ferreira da Silva
Dynamic analysis of concrete dams: fluid structure displacement based interaction models	Nuno Azevedo and Romano Câmara
Experimental and numerical investigation of flood propagation due to trapezoidal breach in the distorted physical model of Urkmez dam	M.Ş. Güney, G. Tayfur, T. Arkis, and G. Bombar

Water Power Dam & Dam Construction Journal



A selection of five papers presented in the Second International DAM WORLD Conference (DW2015) will be published in the Water Power & Dam Construction Journal. The following papers were selected:

Paper title	Authors
Analysis of particle migration phenomena affecting some embankment dams materials	Francesco Federico and Marco Iannucci
Concrete durability investigation of a major hydroelectric arch dam	Ahmad Shayan and Norm Cribbin
Daivões dam spillway: a novel solution for the stilling basin	Elsa Alves, Felix Hernando and Rafael Chacón
Influence of fluid structure interaction on a concrete dam during seismic excitation	Rikard Hellgren and Tobias Gasch
3D analysis of montesinho cfrd using code-aster fem program	João Marcelino, André Serrano, Joao Manso, José Boal Paixão and Laura Caldeira



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Foz Tua power plant under construction located in the Douro river basin
Souto Moura powerhouse design

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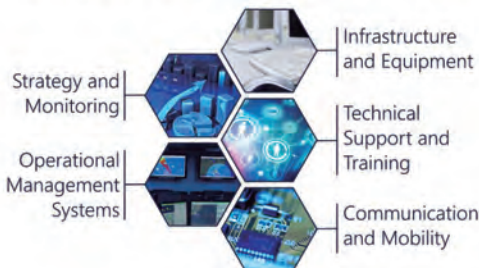
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