

RCC SPANCOLD  
CHINCOLD

6<sup>th</sup>

# International Symposium on Roller Compacted Concrete (RCC) Dams

*Zaragoza*  
Spain

23 to 25, October 2012

Organized by



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GOBIERNO  
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# Tuesday, 23 October

## SPECIAL CONFERENCES

### **RCC DAMS IN SPAIN**

*J.C. de Cea (Spain)*

### **RCC AND CMD DAMS IN CHINA**

*JIA Jinsheng (China)*

### **NEW DEVELOPMENTS IN RCC DAMS**

*M.H.R. Dunstan (United Kingdom)*

## SESSION 1. NEW DEVELOPMENTS IN RCC DAMS

**EXPERIENCES WITH RCC DAMS IN MEXICO.** *F. I. Arreguin-Cortes, R. Murillo-Fernández (Mexico)*

**RECENT DEVELOPMENT IN RCC DAMS TECHNOLOGY IN MOROCCO.** *A.F. Chraïbi (Morocco)*

**CONSTRUCTION OF AN RCC DAM IN A VERY WET CLIMATE.** *J. Waters, D. Cameron-Ellis, M.R.H. Dunstan, L. Houlberg, C. Hicks (Australia)*

**DIAMER BASHA DAM STATUS & POTENTIAL RCC MIXES.** *E. Schrader, I.U. Haq, M. Arshad Pervez (United States)*

**GUANDI HIGHLY RCC GRAVITY DAM – CHALLENGES, SOLUTIONS AND LESSONS.** *Chen Qiang, Hu Xiao-Hong, Zhao Yong-Gang, Zhang Lian-Ming, Yuan Qion (China)*

**PORTUGUES DAM: CHALLENGES AND SUCCESS IN FOUNDATION DOCUMENTATION AND TREATMENT.** *S. Myers, J. Conway (Puerto Rico)*

**STRUCTURAL FEATURES OF GOMAL ZAM RCC ARCH-GRAVITY DAM.** *Chongjiang Du (Alemania)*

**RCC DAM WATER-PROOFING BY MEANS OF HIGH PRESSUER POLYMER INJECTIONS COMPARED TO WATER-PROOF MEMBRANES.** *A. Gonzalo (Spain)*

**NEW TECHNOLOGY ON VERTICAL CONVEYANCE OF CONCRETE BY FULL-BIN SYSTEM IN GUANGZHAO DAM PROJECT.** *Wu Xiurong, Chen Zurong (China)*

**THE USE OF 400 MM RCC LIFTS IN THE ENLARGED COTTER DAM.** *P. Buchanan, D. Nott, B. Egalat, B. Forbes (Australia)*

## SESSION 2. PLANNING AND DESIGN

**DISCUSSIONS ON DESIGN PRINCIPLE FOR SUPER HIGH GRAVITY DAMS BASED ON SIMULATION TEST OF HYDRAULIC FRACTURING.** *Jia Jinsheng, Wang Yang, Feng Wei, Chang Qingrui (China)*

**HRB WALDBÄRENBURG: FIRST RCC DAM EXPERIENCE IN GERMANY.** *B. Lange, F. Hering, R. Schlegel, G. Leyendecker, F. Ortega (Germany)*

**INFLUENCE OF DIFFERENT LAYER THICKNESS AND INTERMITTENT TIME ON HIGH RCC GRAVITY DAM TEMPERATURE STRESS.** *Li Song-Hui, Zhang Guo-Xin, Liu Yi (China)*

**JOINT VISION BY DESIGNER AND CONTRACTOR FOR THE DESIGN OF AN RCC DAM.** *L. Canale, Ö. Özen, E. Eroğlu (Switzerland)*

**MAIN DESIGN FEATURES OF A RCC GRAVITY DAM IN PORTUGAL.** *A. Camelo, N. Antunes, D. Botelho (Portugal)*

**MINIMUM REQUIREMENTS FOR THE FOUNDATION OF RCC DAMS IN BORDER-LINE TERRAINS.** *M. Romana (Spain)*

**MOVING SUCCESSFULLY FROM A CONVENTIONAL CONCRETE INTO AN RCC DESIGN FOR PORTUGUES DAM.** *P. Vázquez, A. Gonzalez (Puerto Rico)*

**NONLINEAR BEHAVIOUR OF A ROLLER COMPACTED CONCRETE DAM UNDER STRONG EARTHQUAKE.** *D. Grenier, A. Si-Chaib, A. Alami (France)*

**SIMULATION OF TEMPERATURES AND STRESSES DURING CONSTRUCTION OF A RCC DAM.** *L.M. Lacoma, J. Rodriguez, J. Martí, F. Martinez (Spain)*

**STUDYING THE EFFECT OF STARTING TIME OF CONCRETE ON THERMAL RESPONSE OF ROLLER COMPACTED CONCRETE DAM.**

*M. Esmailnia Omran, Z. Ghadiri (Iran)*

**DESIGN OF FOUNDATION REMEDIATION FOR A RCC DAM.** *E. Yildiz, A. Fikret Gürdil (Turkey)*

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## SESSION 2. PLANNING AND DESIGN

**THE DEVELOPMENT OF THE DESIGN OF CHANGUINOLA 1 DAM.** *G. Erlendsson, D. Cameron-Ellis, Q.H.W. Shaw, M.R.H. Dunstan (Denmark)*

**THE FOUNDATION OF HARDFILL DAMS. EFFECTS OF SEISMICITY.** *M. Romana, AR. Martinez-Sidera (Spain)*

**THE INFLUENCE OF LOW STRESS-RELAXATION CREEP ON LARGE RCC ARCH & GRAVITY DAM DESIGN.** *Q. Shaw (South Africa)*

**THERMAL RESPONSE OF RCC DAMS CONSIDERING THE EFFECT OF RESERVOIR FILLING SCHEDULE.** *P. Khanzaei, F. Hejazi, A.A. Abdulrazeg, M. Saleh Jaafar, T. Ahmed Mohammed (Malaysia)*

**THREE RECENT GEOMEMBRANE PROJECTS ON NEW RCC DAMS.** *A. Scuero, G. Vaschetti (Switzerland)*

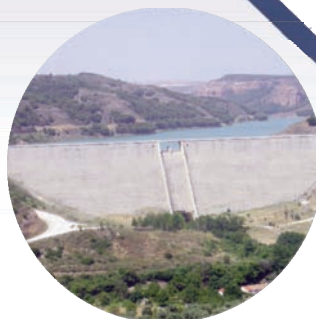
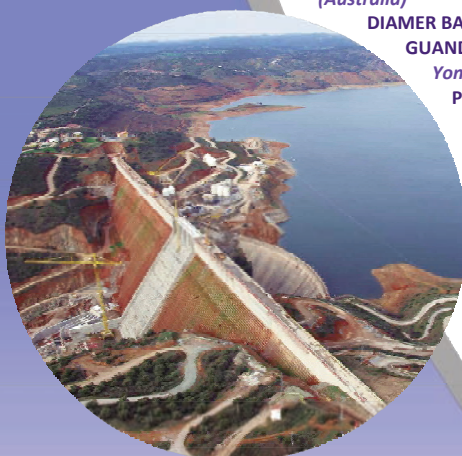
**STUDY AND APPLICATION OF IMPROVED EQUIVALENT STRESS OF FINITE ELEMENT METHOD OF GRAVITY DAMS.** *Yang Huichen, Jia Jinsheng, Zheng Cuiying (China)*

**DE HOOP DAM: SOUTH AFRICAN RCC ADVENTURES.** *H.J. Wright, J. Van Zyl (South Africa)*

## LECTURE

**INNOVATIONS IN RCC DAMS**

*B. Forbes (Australia)*



# Wednesday, 24 October

## LECTURE

### RCC AS DAM CONSTRUCTION MATERIAL

*R. Ibáñez de Aldecoa (Spain)*

## SESSION 3. MATERIAL AND MIXTURES

ACCELERATE CURING TEST: HISTORY, DEVELOPMENT AND APPLICATIONS. *J. E. López, E. Schrader (Colombia)*

APPLICATION RESEARCH ON LOW HEAT AND HIGH PERFORMANCE HYDRAULIC MASS CONCRETE. *Zhang Xihe, Yang Jindi, Tan Jianjun (China)*

CHANGES IN THE WORLD ECONOMY INFLUENCES THE CHOICE OF CEMENTITIOUS MATERIALS AT CHANGUINOLA 1. *E. Lose, M.R.H. Dunstan (Denmark)*

CHOICE OF POZZOLANS FOR USE IN THE CEMENTITIOUS CONTENT OF LARGE RCC DAMS.

*U Myint Zaw, Ondrej Voborny, Nguyen Hong Ha, David Morris, M.R.H. Dunstan (Burma)*

RAW MATERIALS SELECTION AND RCC MIXTURE OPTIMIZATION IN EL PUENTE DE SANTOLEA'S DAM. *J. Gracia, M. Cabedo (Spain)*

EXPERIENCE MADE WITH RETARDER ADMIXTURES AT TWO RCC DAMS IN MYANMAR. *U Myint Zaw, U Zaw Min San, S.L.L. Cowie, C. Rohrer (Burma)*

FEASIBILITY STUDY OF USING ONE PORTION OF AGGREGATE IN KAHIR RCC DAM. *M. Shahgholi, M. Jafarbegloo, M.R. Hajjalikhani (Iran)*

LIMESTONE FILLER USED AS MINERAL ADMIXTURE IN THE RCC MIX FOR LA BREÑA II DAM (SPAIN). *R. Ibáñez de Aldecoa, G. Noriega, F. Romero, A. Sandoval, M. Sanz (Spain)*

MIXTURE DESIGN AND OPTIMIZATION OF RCC OF GUAN-DI HYDROPOWER STATION. *Chenlei Nieqiang (China)*

PRACTICE OF HIGH-INTENSITY BASALT GRAVEL AGGREGATE PRODUCTION SYSTEM IN GUANDI HYDROPOWER STATION. *Zhao Yunliang, Zhang Chaofeng (China)*

RCC MIX DESIGN DEVELOPMENT FOR ENCISO DAM. *M. Allende Álvarez, D. Cruz García, F. Ortega Santos (Spain)*

RCC MIXTURES FORMULATION FOR TABELLOUT DAM. *M. Khalfallah, A. Si-Chaib, K. Mokrani (France)*

RCC TRIAL MIX PROGRAMME FOR THE LAI CHAU GRAVITY DAM – HIGH CEMENTITIOUS CONTENT RCC WITH VERY LOW CEMENT CONTENTS. *Nguyen Pham Hung, M. Conrad, D. Morris, M.R.H. Dunstan (Vietnam)*

RESULTS OF MIX DESIGNS IN ZIRDAN RCC DAM. *M. Jafarbegloo, M.R. Hajjalikhani (Iran)*

RIZZANESE RCC DAM : USE OF LOW COST RCC IN A THICK CROSS SECTION. *F. Delorme, A. Lochu, R. Valon (France)*

THE EXPERIMENTAL ANALYSIS OF ALKALI-CARBONATE REACTIONS ON RCC DAMS IN IRAN. *N. Tavakoli Shirazi, G. Hossein Akbari (Iran)*

THE LOW STRESS RELAXATION CREEP CHARACTERISTICS OF FLYASH-RICH RCC. *Q.H.W. Shaw, M.R.H. Dunstan (South Africa)*

THE OPTIMIZATION OF THE RCC MIX DESIGN OF THE SPRING GROVE DAM IN SOUTH AFRICA. *J. Nyakale, D.B. Badenhorst, F. Ortega Santos (South Africa)*

USE OF A HIGH SHRINKAGE AGGREGATE IN A NEW RCC DAM. *D. Nott, B. Forbes, D. Brigden (Australia)*

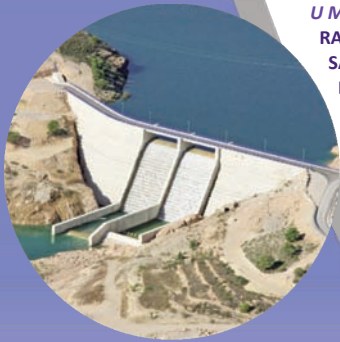
## SESSION 4. CONSTRUCTION AND QUALITY CONTROL

DIGITAL MONITORING SYSTEM AND APPLICATION ON LUDILA PROJECT. *Zhang Guo-Xin, Li Song-hui, Liu Yi (China)*

FEEDBACK ANALYSIS ON CAUSES AND MECHANISM OF CRACK FORMATION AND EFFECTS OF TEMPERATURE CONTROLLING AND CRACK PROTECTING DURING CONSTRUCTION OF RCC DAMS. *Liu Youzhi, Xu Bo, Zhang Guo-Xin, Shi Ziming, Liu Tao (China)*

INVESTIGATION OF DIFFERENT PARAMETERS ON SHEAR STRENGTH AND PERMEABILITY OF CONSTRUCTION JOINTS. *Mokhtar Pouryani, F. Ghadermazy, H.R. Araghyan, Sh. Mahzarnya (Iran)*

QUALITY CONTROL IN ZIRDAN RCC DAM. *M. Jafarbegloo, M.R. Hajjalikhani (Iran)*



## SPECIAL CONFERENCE

### LESSONS LEARNED AND INNOVATIONS FOR EFFICIENT RCC DAMS

*F. Ortega (Germany)*

## SESSION 4. CONSTRUCTION AND QUALITY CONTROL

DEVELOPMENT OF THE RCC FOR MIDDLE VAITARNA DAM, INDIA. *V.B. Astankar, G.V. Rao, S. Mane, M.R.H. Dunstan (India)*

RCC DAM CONSTRUCTION QUALITY CONTROL – NUCLEAR GAUGE DENSIMETER CALIBRATION. *J.E. López, E. Schrader (Colombia)*

USE OF A GEOGRAPHIC INFORMATION SYSTEM AS A TOOL DURING THE CONSTRUCTION OF THE PIRRIS RCC DAM IN COSTA RICA. *D. Núñez Morales, F. Ortega Santos (Costa Rica)*

A UNIQUE CEMENT AND FLY ASH SUPPLY SYSTEM FOR THE CHANGUINOLA I PROJECT IN PANAMA. *A. Lighthart, C. Hicks (Holland)*

ASSESSMENT OF RCC CONSTRUCTION METHODOLOGY BETWEEN YEYWA AND UPPER PAUNGLAUNG RCC DAMS IN MYANMAR. *U Myint Zaw, U Zaw Min San, S.L.L. Cowie, C. Rohrer (Burma)*

CHARACTERIZATION AND QUALITY CONTROL OF RCC DAM PRESA DEL PUENTE (TERUEL, SPAIN). *J. Arroyo Alonso, L. Fernández Almiñana, A. Sánchez Lallana (Spain)*

CONSTRUCTION OF PIRRIS RCC DAM IN COSTA RICA. *I. Arguedas Gamboa, A. Rivera Hernández, F. Ortega Santos (Costa Rica)*

CONSTRUCTION TECHNOLOGY OF RCC DAM COMPOSED OF SANDSTONE AGGREGATE IN TROPICAL RAINFOREST. *Zhu Hong bin, Yang Bai hua, Fu Jian ping, Cui Dan (China)*

DESIGN AND BUILD OF RIZZANESE RCC DAM. *A. Lochu, F. Delorme, P. Carlioz (France)*

DESIGN AND CONSTRUCTION OF NAKAI RCC DAM, LAOS. *G. Stevenson, R. Douglas, M. Matsuzaki (Canada)*

DYNAMIC CONSTRUCTION SIMULATION OF HIGH ROLLER COMPACTED CONCRETE DAM. *Denghua Zhong, Haotian Chang, Mingchao Li (China)*

EL PUENTE DE SANTOLEA'S DAM EXPERIENCE. *M. Cabedo, B. Roldán, J.I. López (Spain)*

RAPID CONSTRUCTION TECHNOLOGY OF GUANDI RCC GRAVITY DAM. *Zhao Yunliang, Zhang Chaofeng (China)*

ENCISO DAM: GEOLOGICAL AND GEOTECHNICAL CONSTRAINTS OF THE FOUNDATION. CONSOLIDATION TREATMENT. *M. Allende Álvarez, D. Cruz García, A. Soriano Martínez, A. Andriño Sigilo, D. Chuliá Sanz (Spain)*

# Thursday, 25 October

## SESSION 4. CONSTRUCTION AND QUALITY CONTROL

LESSONS LEARNED IN ZIRDAN RCC DAM. *M.R. Hajjalikhani, M. Jafarbegloo (Iran)*

NOT ONLY SIZE MATTERS CONSTRUCTING NAKAI RCC DAM FOR NAM THEUN 2 PROJECT IN LAOS. *A. Rousselin, F. Delorme, B. Taquet (France)*

PRACTICAL EXPERIENCES FOR CONSTRUCTION OF RECENT RCC DAMS IN IRAN CONSIDERING ADVANCED TECHNOLOGIES. *A. Dolatkahi, R. Peyrovdin, M. Navidi Kashani, S. Mahzarnia (Iran)*

RCC DAM CONSTRUCTION – CONVEYORS OR TRUCKS. *J.E. López, E. Schrader, L. Gaekel (Colombia)*

RCC DAM CONSTRUCTION TECHNIQUE INNOVATION OF JINANQIAO HYDROPOWER STATION ON JINSHAJIANG RIVER. *Li Xianzhen (China)*

RCC DAMS BUILT BY SPANISH CONSTRUCTION COMPANIES ABROAD. *A. Capote del Villar, R. Ibáñez de Aldecoa, V. Flórez Casillas (Spain)*

APPLICATION OF RCC DAM CONSTRUCTION TECHNIQUE IN XIANGJIABA HYDROPOWER STATION. *Gao Peng, Mei Xuedong, Peng Gang, Wang Yi (China)*

REVIEW OF THE CONSTRUCTION OF THE SON LA RCC DAM. *Nguyen Hong Ha, Marco Conrad, David Morris (Vietnam)*

SCENARIO OF RCC DAMS IN MEXICO. *A. Garduño Gallo, M.A. Montero Catalán (Mexico)*

LONGITUDINAL JOINT BEHAVIOR IN A TWO STAGE CONSTRUCTION OF CASTANHÃO DAM. *W. Jardim, M. Pinto (Brasil)*

STUDY ON EXISTING PROBLEMS AND COUNTERMEASURES OF ROLLER COMPACTED. *Dong Hao-Wen, Tang Shun-Cheng, Ji Wei (China)*

IMMERSION VIBRATED RCC (IVRCC) FIRST WORLD EXPERIENCE AT DE HOOP RCC DAM IN SOUTH AFRICA. *J.F. van Niekerk, J. van Niekerk, F. Ortega Santos (South Africa)*

CONSTRUCTION OF GUANDI RCC DAM. *Shiyong Wu, Shangyuan Yan, Lei Yao, Dan Zhao, Fugang He (China)*

THE SPECIFICATION OF THE EFFECTIVE METHOD FOR DEMOLITION OF HARDENED ROLLER COMPACTED CONCRETE (RCC) USED IN KERMAN GHADROUNI DAM. *M. Abbasi, M.R. Jamshidi Jam (Iran)*

DESIGN AND CONSTRUCTION ADVANTAGES OF HARDFILL SYMMETRICAL DAMS - CASE STUDY: SAFAF DAM IN EASTERN ALGERIA. *T. Guillemot, M. Lino (France)*

NEW PROGRESS OF CEMENT-SAND-GRAVEL DAMMING IN CHINA. *Wu Xiurong, Chen Zhen Hua, Lin Shengzhu (China)*

STUDY ON DESIGN OF MIXING PROPORTION FOR CEMENTED SAND AND GRAVEL (CSG). *Feng Wei, Jia Jinsheng, Ma Fengling (China)*

CRACKING PREVENTION OF GUANDI RCC GRAVITY DAM. *Li Guoshan, Zhu Haixia, Zhao Yong-Gang, Zhang Lian-Ming (China)*

FINAL DESIGN OF A 135-M HIGH RCC DAM IN VENEZUELA. *F. Ortega Santos, C. Granell, A. Soriano, A. Andres, A. Bello, A. Hitcher (Germany)*

## LECTURE

PERFORMANCE OF RCC DAMS

*E. Schrader (United States)*

## SESSION 5. PERFORMANCE AND MONITORING

QUANTITATIVE MICROCRACK ANALYSIS OF RCC SUFFERED DIFFERENT FREEZING-THAWING

DAMAGE DEGREES BY DIP TECHNIQUE. *Shuguang Li, Wei Feng, Juntao Tian, Gaixin Chen, Yihui Lu (China)*

SEEPAGE ANALYSIS OF GUANGZHAO RCC GRAVITY DAM.

*Xiaohui Qian, Hao Yang, Lin Luo (China)*

THE SUMMARY OF SAFETY MONITORING AND OPERATION

ABOUT RCC GRAVITY DAM IN CHINA. *Du Xiaokai, Zhao*

*Quansheng, Dang Lincai (China)*

THE TENSILE STRENGTH OF RCC FOR DAMS. *T.P. Dolen, M.R.H.*

*Dunstan (United States)*

THERMAL INDUCED CRACKING PERFORMANCE OF RCC DAMS. *K.D.*

*Hansen, B.A. Forbes (United States)*

## SESSION 6. OTHER APPLICATIONS OF RCC

RCC USE IN COFFERDAMS. *K.D. Hansen, D.L. Johnson (United States)*

LESSON LEARNED – MORE THAN 100 RCC OVERTOPPING SPILLWAYS IN THE UNITED STATES.

*R.P. Bass, T. Fitzgerald, K.D. Hansen (United States)*

SOME KEY EXPERIENCES ON THE RCC COFFERDAM CONSTRUCTION OF THE THREE GORGES PROJECT.

*Chen Xianming, Li Jinghua, Xiong Jihong (China)*

RCC IN SMALL PROJECTS. *L. Pinilla B. (Chile)*

HYDRAULIC SCALE MODEL OF A 50 METERS HIGH STEPPED SPILLWAY ON A RCC DAM IN THE SULTANATE OF

OMAN. *P.E. Loisel, P. Jehanno, C. Guilbaud, S. Al Hadhrami (France)*

STEPPED SPILLWAYS WITHOUT SIDEWALLS: SCALE MODEL STUDY. *S. Estrella, M. Sánchez-Juny, J. Pomares, J. Dolz,*

*R. Ibáñez de Aldecoa, M. Domínguez, J. Rodríguez, L. Balairón (Spain)*

STUDY ON UNDERFLOW ENERGY DISSIPATION TECHNOLOGY OF HIGH RCCD FLOOD DISCHARGE. *Peng Wen-ming, Zhang*

*Lian-ming, Zhao Yong-gang, Hu Xiao-hong (China)*

THE HIGHEST RCC DAM IN THE LAO P.D.R. -INTRODUCTION OF NAM NGIEP 1 HYDROPOWER PROJECT- *N. Kita, T. Kamachi,*

*M. Asakawa, T. Tada (Afghanistan)*

## SESSION 5. PERFORMANCE AND MONITORING

BACK ANALYSIS OF SEEPAGE IN ROLLER COMPACTED CONCRETE GRAVITY DAM. *Liu Chang-jun, Zhang Shunfu, Liao Jingxia, Zhu Yue-ming (China)*

DAM SAFETY MONITORING TO ASSESS VAL DAM BEHAVIOR. *R. Gómez*

*López de Munain, J. Merino Vidruero, M. G. de Membrillera Ortuño (Spain)*

EVALUATION OF SAFETY AND STRUCTURAL STABILITY OF JEGIN RCC DAM DURING OPERATION PERIOD. *M.*

*Esmailnia Omran, H. Mahdiloo Torkamani (Iran)*

MONITORING MODEL FOR DISPLACEMENT FIELD OF

RCCD. *Chen Xudong, Gu Chongshi, Xu Baosong*

*(China)*

PROPOSING A STANDARDIZED APPROACH

TO STRESS-STRAIN INSTRUMENTATION

FOR RCC DAMS. *M. Conrad, Q.H.W.*

*Shaw, M.R.H. Dunstan (Switzer-*

*land)*

