TABLE OF CONTENTS

VOLUME 1

MECHANICS OF MATERIALS

SESSION: D1-S1: EFFECT OF ELEVATED TEMPERATURE ON CONCRETE

USING TIME-TEMPERATURE SUPERPOSITION ON CREEP OF NUCLEAR CONCRETE ........................................... 1
Grasley Zachary, Baranikumar Aishwarya, Torrence Christa E.

INFLUENCE OF CEMENT TYPES AND SHRINKAGE REDUCING ADMIXTURE ON FRACTURE PROPERTIES OF CONCRETE EXPOSED TO SUSTAINED ELEVATED TEMPERATURES UP TO 175°C .................................................. 10
Matsuzawa Koichi, Kasami Hideo, Tayama Takafumi, Nishi Hironobu, Maenaka Toshinobu, Nakanuma Hiroki, Moriya Kenichi

EFFECTS OF CEMENT, CHEMICAL ADMIXTURE AND SHRINKAGE REDUCING AGENT ON THE STRENGTH CHARACTERISTICS OF CONCRETE SUBJECTED TO ELEVATED TEMPERATURE EXPOSURE .................................................. 19
Kasami Hideo, Nishi Hironobu, Matsuzawa Koichi, Tayama Takafumi, Abe Michihiko, Maenaka Toshinobu

EXPERIMENTAL STUDY ON RESIDUAL MECHANICAL PROPERTIES OF CONCRETE AFTER HIGH TEMPERATURE EXPOSURE UNDER AXIALLY LOADED CONDITION .............................................................. 28
Tomofuji Hiroshi, Morita Takeishi, Watanabe Kohei, Yamada Sayo, Hayashi Akiko

DEVELOPMENT OF A NOVEL DAMAGE MODEL FOR CONCRETE SUBJECTED TO HIGH TEMPERATURE AND CONSTRAINT ................................................................................................................................. 38
Draup Jefri, Gaingnant Alexandre, Colette Gaetan, Doughty Graham, Guo Jiashong, Helfer Thomas, Torelli Giacomo, Mandal Partha

SESSION: D1-S2: MATERIAL PROPERTIES, MODELLING, AND SIMULATION

COUPLED PROTIUM AND DEUTERIUM DIFFUSION MODEL FOR PREDICTION OF HYDROGEN ISOTOPE DISTRIBUTIONS IN ZR-NB PRESSURE TUBES ...................................................................................... 48
Nadean Eric, Metzger Donald

EVALUATION OF BOND CONDITION FOR POST-INSTALLED ADHESIVE ANCHOR BY NEUTRON BEAM TECHNIQUES .................................................................................................................................................. 58
Matsuzawa Koichi, Sitzuki Hiroshi, Mukai Tomohisa, Tanuma Takehiko, Kanematsu Manabu, Ueno Kazuki

CREEP-CYCLIC DEFORMATION IN HIGH TEMPERATURE POWER PLANT STRUCTURAL MATERIALS: INFORMING ASSESSMENT PROCEDURES IN INDUSTRY VIA MULTI-SCALE PHYSICAL MODELLING ......................................................................................... 66
Cocks Alan, Petkov Markian, Chevalier Marc, Dean David

CHARACTERIZATION OF VIRGIN ZXF-5Q AND AXF-5Q POCO GRAPHITE ................................................................................................. 76
Elgewairy Dina, Eapen Jacob

MICROSCOPIC AND SPECTROSCOPIC ANALYSIS OF FRETTING WEAR OF ALLOY 617 AT ELEVATED TEMPERATURES ................................................................................................................................. 80
Darwish Ahmed, Eapen Jacob

SESSION: D1-S3: PROPERTIES AND MODELLING OF NUCLEAR CONCRETE

REVISED CONSTITUTIVE CRITERIA FOR CONCRETE IN APPLICATIONS OF THE DISCRETE ELEMENT METHOD (DEM) ........................................................................................................................................... 82
Riera Jorge, Miguel Leticia, Iturroz Ignacio

EFFECTIVENESS OF USING OF LIMESTONE AS CEMENT REPLACEMENT IN NUCLEAR RELATED CONCRETE STRUCTURES COMPARED TO TRADITIONAL SUPPLEMENTARY CEMENTING MATERIALS ...................................................................................................................... 92
Panesar Daman, Zhang Runxiao
NUMERICAL ANALYSIS OF ONE-DIRECTIONAL MOISTURE FLOW IN CONCRETE SPECIMENS ............................................................................................................. 100
Dury Julia, Terheren Julia, Kwon Ohsung, Benz Evon

DISCUSSION OF THE INFLUENCE OF CEMENT TYPE AND SHRINKAGE REDUCING AGENT ON WATER CONTENT AND COMPRESSION STRENGTH DISTRIBUTION OF AGED SHIELDING WALL ............................................................................................................. 108
Inaba Kazuo, Nishi Hironobu, Kasami Hideo, Matsuizawa Koichi, Quan Hongchu, Tayama Takaomi, Maenaka Toishobu, Nakamura Hiroshi

SESSION: D1-S5: STEELS AND ALLOYS

CRACKING BEHAVIOR OF THERMALLY AGED AUSTENITIC STAINLESS STEEL WELD ............................................................................................................. 118
Chen Yiren, Xu C, Yang Y, Chen WY, Alexandrean B, Natesan K, Rao A

DIFFUSION COEFFICIENT MODELLING IN ZR 2.5%NB FOR USE IN PROBABILISTIC ROLLED JOINT DEUTERIUM UPTAKE ASSESSMENTS OF CANDU REACTORS ............................................................................................................. 128
Nadeau Eric, Metzger Donald

MATERIALS INTEGRITY CONSIDERATIONS AND TECHNICAL GAP ASSESSMENT FOR MOLTEN SALT NUCLEAR REACTORS ............................................................................................................. 138
Raiman Stephen, Sulemanovic Dino, Raiman Stephen, Garrison Lauren, Wang Hong, Li Lianshan, Silva Chinthaka, Busby Jeremy

POTENTIALS AND ISSUES OF ADDITIVE MANUFACTURED COMPONENTS FOR NUCLEAR POWER PLANTS ............................................................................................................. 142
Triegelaff Ralf, Schulz Axel, Fischer Torsten, Beckert Martin, Kuhn Bernd

REHEAT CRACKING INITIATION PREDICTION IN AUSTENITIC STEEL USING FINITE ELEMENT ANALYSIS AND VALIDATIONS ............................................................................................................. 155
Berre Weiwing, Schmitz Mark

SESSION: D1-S4: PROPERTIES OF CONCRETE

HOMOGENIZATION OF CONCRETE MICROSTRUCTURES IN NUCLEAR POWER PLANTS ............................................................................................................. 165
Grasley Zachary, Torrence Christa E, Barmokumar Aishwarya, Garbozzi Edward

STRESS-STATE AND TIME-DEPENDENT DEFORMATION CHARACTERISTICS FOR CEMENTITIOUS MATERIALS ............................................................................................................. 173
Mhamankar Subodh, Jones Christopher

RESEARCH AND STANDARDIZATION OF HIGH-QUALITY RECYCLED AGGREGATES FOR CONCRETE IN NUCLEAR POWER PLANTS ............................................................................................................. 182
Kasami Hideo, Masuda Yoshio, Ikeuchi Toshiyuki, Tateyashiki Hisashi, Akatsuka Hisanobu, Noguchi Takaomi, Tamura Masaki, Yanagibashi Kunio

EFFECTS OF ALKALI-SILICA REACTION ON MECHANICAL PROPERTIES AND STRUCTURAL CAPACITIES OF REINFORCED CONCRETE STRUCTURES ............................................................................................................. 192
Phan Long, Philip Jacob, Sadek Fahim, Thonstad Travis, Lew Hs, Marcu Sorin

SESSION: D2-S1: LEAK BEFORE BREAK 1

EXPERIMENTAL SUPPORT TO EUROPEAN ATLAS+ PROJECT ............................................................................................................. 201
Moinereau Dominique, Deliolou Patrick, Dahl Anna, Nicat Tomas

THE HUGE MISSING FACTOR IN LBB ANALYSIS – HOW A CIRCUMFERENTIAL THROUGH-WALL CRACK IN A PIPE SYSTEM CHANGES THE FLEXIBILITY AND REDUCES THE APPLIED MOMENTS ............................................................................................................. 213
Wilkowski Gery, Brust Frederic, Uddin Mohammed, Kalyanam Sureshkumar

DUCTILE TEARING OR PLASTIC COLLAPSE? ............................................................................................................. 225
Gilles Philippe, Marques-Viera Edith, Olivier Anelet, Delliou Patrick, Grasse Thierry

DEVELOPMENT OF COMPUTATIONAL MACROS FOR COMPLETE FAST FRACTURE ANALYSES ............................................................................................................. 235
Ching Hsukuang, Thiery Laurent, Burr Jason, Moreaux Mathieu
SESSION: D2-S2: LEAK BEFORE BREAK 2

ONGOING WORK AND IMPROVEMENT OF LEAK BEFORE BREAK METHODOLOGY FOR SODIUM FAST REACTORS

Deschanels Hubert, Pignol Moise, Gilles Philippe, Lacroix Remi, Dischert Sandrine

EUROPEAN PROJECT ATLAS+: SMALL AND LARGE SCALE DUCTILE TEARING EXPERIMENTS ON FERRITIC STEEL WBS6 TO STUDY TRANSFERABILITY OF MATERIAL DUCTILE PROPERTIES

Moinereau Dominique, Deillieu Patrick, Dahl Anna, Vincent Willy

COMPUTATIONAL ASSESSMENT OF ASYMMETRIC CRACK SIZE OF A PROTOTYPE SIZED PIPE BEND: COMPARISON WITH A16 MASTER CURVE

R Suresh Kumar, Rao Bn, Velusamy K, Jalaldeen

BENCHMARKING PROBABILISTIC ANALYSIS LBB CODES AGAINST DETERMINISTIC LBB ANALYSIS

Kurth Robert, Sallaberry Cedric, Twombly Elizabeth

SESSION: D2-S3: J AND TOUGHNESS EVALUATION SCHEMES FOR FRACTURE MECHANICS ASSESSMENT

J PREDICTIONS FOR DEFECTIVE PIPE ELBOWS VIA THE REFERENCE STRESS METHOD

Lei Yuebao

PROSPECTIVE F.E. MODELING FOR THE DEVELOPMENT OF A J ANALYTICAL SCHEME FOR HORIZONTAL PIPING SUBMITTED TO THERMAL STRATIFICATION

Chappeliot Stephane, Marie Stephane

OPTIMIZED J EVALUATION SCHEME FOR THE FRACTURE MECHANICS ASSESSMENT OF COMPLEX PIPING SYSTEMS SUBJECTED TO VARIOUS LOADING SETS

Chappeliot Stephane, Marie Stephane

AN IMPROVED REGRESSION ANALYSIS FOR PREDICTION FOR TOUGHNESS OF FULLY AGED CAST STAINLESS STEELS

Sallaberry Cedric, Wilkowski Gery, Uddin Mohammed

SESSION: D2-S7: FRACTURE TESTING

CONSTRAINT EFFECTS WHEN DETERMINING FRACTURE TOUGHNESS/MATERIAL FRACTURE RESISTANCE FROM SURFACE CRACKED ELBOWS, SENT, AND CT SPECIMENS

Kalyanam Suresh Kumar, Wilkowski Gery, Hoe Junior, Brust Frederick, Punch Edward

USING LOCAL APPROACHES TO FRACTURE TO QUANTIFY THE LOCAL CONDITIONS DURING THE DUCTILE-TO-BRITTLE TRANSITION IN FERRITIC STEELS

Yankova Maria, Jivkov Andrey, Sherry Andrew, Patel Rajesh

FRACTURE TOUGHNESS CHANGES WITH SURFACE CRACK DEPTH – THE “BACK-SURFACE CONSTRAINT” EFFECT

Wilkowski Gery, Kalyanam Suresh Kumar, Brust Frederick, Uddin Mohammed, Mukhopadhyay D

ANALYSIS OF P-SPT SPECIMENS USING DAMAGE MECHANICS MODEL TO PREDICT J-INITIATION AND ITS EXPERIMENTAL VERIFICATION

Shikhalgar Taslim, Chattopadhyay Jayanta, Dutta Bijan

IDENTIFICATION OF RUPTURE PARAMETERS FOR IRRADIATED NUCLEAR FUEL

Gati Jean, Henry Ronan, Zacharia-Aubrun Isabelle, Langlois Cyril, Meille Sylvain

SESSION: D2-S4: GENERIC FRACTURE ISSUES 1

APPLICATIONS OF PROBABILISTIC FRACTURE MECHANICS FOR PRESSURE TUBES

Wasiluk Bogdan, Carroll Blair, Tsembeles Konstantinos, Jim John

LARGE SCALE MODELLING OF DAMAGE AND FAILURE OF NUCLEAR GRAPHITE MODERATED REACTOR

Farrokhnia Ahmadreza, Jivkov Andrey

PRESSURIZED THERMAL SHOCK PROBABILISTIC SENSITIVITY ANALYSIS

Stefanini Lorenzo, Uitslag-Dooolard H, Shams A, Blom F

INFLUENCE OF BOTTOMED OUT SPRING HANGER SUPPORT ON STEAM

Chaudhry Khalid
CHANGE IN FRACTURE TOUGHNESS OF OFE COPPER DUE TO ELECTRON IRRADIATION ........................................... 417
Ghodke Shyam, Dutta Bijan

EXPERIMENTAL STUDY OF THE SEISMIC BEHAVIOR OF CORRODED RC BEAMS ........................................... 427
Lejouad Chaynaa, Richard Benjamin, Mongabure Philippe, Capdevielle Sophie, Raguenneau Frederic

SEISMIC ANALYSIS OF THE NUCLEAR REACTOR VESSEL CONSIDERING HYDRAULIC LOADS DURING OPERATING CONDITION ........................................... 436
Lee Eunho, Lee Sangjeung, Park Nocheol, Choi Youngin, Park Jongbeom

FLUID STRUCTURE INTERACTION METHOD IN ASSESSMENT OF DYNAMIC RESPONSE OF VVER 440 REACTOR INTERNALS TO PRESSURE SHOCK INDUCED BY LARGE LOCA ACCIDENT ........................................... 446
Gal Petr, Svrec Miroslav, Pistora Vladislav

A METHOD FOR MONITORING VIBRATIONAL FATIGUE OF STRUCTURES AND COMPONENTS ........................................... 455
Moussallam Nadim, Ziegler Rainer, Rudolph Juergen, Bergholz Steffen

DYNAMICAL ASSESSMENT OF VVER REACTOR INTERNALS FOR LARGE BREAK LOCA ........................................... 465
Pistora Vladislav, Gal Petr, Svrec Miroslav

SESSION: D2-S8: ASSESSMENT OF DYNAMIC LOADINGS

NON-UNIFORM FATIGUE CRACK PROPAGATION TEST CROSSING INTERFACE IN CLADDED PLATE ........................................... 475
Nagai Masaki, Miura Naoki, Nagashima Toshio

MODELING OF NATURAL CRACK GROWTH WITH XFEM ........................................... 481
Duun Xinjian, Shi Yihai, Wang Min

WEIGHT FUNCTION BASED STRESS INTENSITY FACTOR SOLUTION FOR NOZZLE CORNER CRACKS ........................................... 490
Shim Dojun, Dedhia Dilip, Somasundaram Deepak

STRESS INTENSITY FACTOR FOR DEFECTS IN THE STEAM GENERATOR TUBE SHEETS ........................................... 499
Chapullot Stephane, Brada Soumaya

DETERMINATION OF SIGNIFICANT TEMPERATURE FLUCTUATION LIMIT CONSIDERING RATE OF TEMPERATURE CHANGE ........................................... 511
Bourguigne Gaston

SESSION: D2-S5: GENERIC FRACTURE ISSUES 2

PREDICTING THE IMPACT OF CRDM THERMAL SLEEVE WEAR IN WESTINGHOUSE PRESSURIZED WATER REACTORS ........................................... 520
Rudland David, Cumbridge Stephen, Demers Jerrod, Anzalone Reed

FATIGUE DAMAGE MANAGEMENT ACCORDING TO PERFORMANCE BASED MAINTENANCE (PBM) CONCEPT ........................................... 531
Kamaya Masayuki

SENSITIVITY ANALYSIS METHODOLOGY FOR PROBABILISTIC FRACTURE MECHANICS OUTPUT ........................................... 541
Somasundaram Deepak, Shim Dojun, Dedhia Dilip, Harrington Craig

USE OF ALUMINUM FOAM ENERGY DISSIPATING SYSTEM IN ITER RC STRUCTURES ........................................... 548
Ezeberry Javier, Combescure Didier, Cabrero Adrian

SWELLING OF THE WWER-1000 REACTOR CORE BAFFLE ........................................... 559
Dubyk Yaroslav, Filonov Vladislav, Filonova Yuliia

SESSION: D3-S8: SOIL-STRUCTURE INTERACTION 2

PRELIMINARY INVESTIGATIONS ON THE RESPONSE OF NUCLEAR POWER PLANTS TO AIRCRAFT IMPACT CONSIDERING SOIL-STRUCTURE INTERACTION ........................................... 569
Feldbusch Arthur, Sadegh-Azari Hamid

STOCHASTIC ESSI ANALYSIS ........................................... 579
Jeremic Boris, Wang Fangbo, Wang Hexiang, Yang Han, Feng Yuan
SEISMIC RESPONSE ANALYSIS OF NUCLEAR ISLAND BUILDING CONSIDERING PILE-SOIL-STRUCTURE INTERACTION .................................................................................................................. 589
Sun Xiaoying, Zhang Chaoli, Yang Jianhua

AN ENHANCED EQUIVALENT LINEAR SOIL-STRUCTURE INTERACTION ANALYSIS APPROACH FOR SEISMIC APPLICATIONS .................................................................................. 598
Talebinejad Inan, Koshab Ben, Tehrani Payman, Prez Michel

STUDY OF NONLINEAR SSI ANALYSIS OF CONCRETE SHEAR WALL BUILDINGS USING TIME DOMAIN AND FREQUENCY DOMAIN APPROACHES .................................................. 608
Madurarappersuma Manoj, Kawanabe Tomoaki, Niwa Kazukuni, Horiguchi Tomohiro

SESSION: D3-S1: FLUID-STRUCTURE INTERACTION 1

VERIFICATION OF NUMERICAL MODELS FOR SEISMIC FLUID-STRUCTURE INTERACTION ANALYSIS OF LIQUID METAL NUCLEAR REACTORS .................................................................. 616
Yu Chingching, Mir Faizanulhaq, Cohen Michael, Coleman Justin, Bardet Philippe, Whittaker Andrew

SEISMIC EXPERIMENTAL STUDY OF HUGE COMPLEX STORAGE TANK IN NUCLEAR ISLAND BASED ON FLUID-STRUCTURE INTERACTION ........................................................................... 626
Xu Ting, Cha Meng, Ge Honghui

DATASET GENERATION FOR VALIDATION OF FLUID-STRUCTURE INTERACTION MODELS ................................................................................................................................. 635
Mir Faizanulhaq, Whittaker Andrew, Yu Chingching, Cohen Michael, Coleman Justin, Bardet Philippe

INFLUENCE OF SOIL STIFFNESS ON SLOSHING EFFECT IN THE ABWR POOLS ................................................................................................................................. 645
Goto Yoshiko, Onitsuka Shokai, Hjima Toshiki

VALIDATION AND DETERMINATION OF SIGNIFICANT SIMULATION PARAMETERS USING THE SPH CODE NEUTRINO ........................................................................................................... 655
Ryan Emerald, Bardet Philippe, Sampa Ramprasad, Montanari Niels, Prescott Steven, Andre Mathieu

SESSION: D3-S12: SOIL-STRUCTURE INTERACTION 6

A FEASIBILITY STUDY ON DOMAIN REDUCTION METHOD FOR NON-LINEAR SEISMIC RESPONSE ANALYSIS OF SOIL-STRUCTURE INTERACTION SYSTEM ................................................................ 665
Niita Yuhei, Hayashi Kohe, Matsumoto Masashi, Akimoto Masahito, Ogata Takanori

SEISMIC ENERGY FLOW CALCULATION FOR EARTHQUAKE SOIL STRUCTURE INTERACTION SYSTEM ......................................................................................................................... 675
Jeremie Boris, Feng Yuan, Yang Han, Wang Hexiang, Wang Fangbo

SEISMIC SOIL-STRUCTURE INTERACTION BEHAVIOR OF NUCLEAR REACTOR BUILDING ................................................................................................................................. 684
Dubey Ramanand, Kulip Shashank, Saheen Navjeev

SENSITIVITY STUDIES FOR DEEPLY EMBEDDED NUCLEAR ISLAND SSI MODELS WITH PILE FOUNDATIONS INCLUDING THE EFFECTS OF SEISMIC MOTION SPATIAL VARIATION AND NONLINEAR SOIL BEHAVIOR ......................................................................................................................... 692
Ghiocel Dan

SESSION: D3-S3: FLUID-STRUCTURE INTERACTION 3

CALCULATION OF THE NATURAL FREQUENCIES OF A FLUID-FILLED PIPE SYSTEM WITH THE COUPLED CODES DYRO/ROHR2: COMPARISON WITH AN ANALYTICAL SOLUTION AND VALIDATION ............................................................................................................... 702
Neuhau Thorsten

COUPLED FLUID-STRUCTURE SIMULATION OF AIR-STEAM LEAKAGE IN SMALL-SCALE CONCRETE SPECIMENS ........................................................................................................................ 712
Bahr Ludvig, Sievers Juergen, Herrmann Nico, Zemann Moritz

CALCULATIONS OF POTENTIAL LOSS OF WATER IN WATER BASIN DUE TO NEW EARTHQUAKE DATA ................................................................................................................................. 722
Bigallon Pauline, Fournier Maxime, Desrayaud Cyrille, Besson Nicolas