

**Publications of the projects in
2005**

Enhanced methods for reactor analysis (EMERALD)

Scientific publications

Hämäläinen, A., Applying thermal hydraulics modeling in coupled processes of nuclear power plants. VTT Publications 578, Espoo 2005, 103 p. + app. 99 p., ISBN 951-38-6667-X, ISSN 1235-0621. Doctor's thesis (Lappeenranta University of Technology, Department of Energy and Environmental Technology).

Conference papers

Daavittila, A., Hämäläinen, A., Miettinen, J. & Rätty, H., Transient and fuel performance analysis with VTT's coupled code system. International Topical Meeting on Mathematics and Computation, Supercomputing, Reactor Physics and Nuclear and Biological Applications, September 12-15, Avignon, France. Invited paper.

Höglund, R., Reactor physics and dynamics research within the EMERALD project. XII Meeting on Reactor Physics Calculations in the Nordic Countries, May 19-20, 2005, Halden, Norway. 6 p. Also as EMERALD summary report in: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 22 – 29. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>

Kotiluoto, P. & Wasastjerna, F., VENUS-2 MOX-fuelled reactor dosimetry benchmark calculations at VTT. International Topical Meeting on Mathematics and Computation, Supercomputing, Reactor Physics and Nuclear and Biological Applications, September 12-15, Avignon, France. 12 p.

Leppänen, J., A systematic study of cross section library based discrepancies in LWR criticality calculations. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 30 – 37. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Leppänen, J., Diffusion code group constant generation using the Monte Carlo method. XII Meeting on Reactor Physics Calculations in the Nordic Countries, May 19-20, 2005, Halden, Norway. 13 p.

Leppänen, J., A new assembly-level Monte Carlo neutron transport code for reactor physics calculations. International Topical Meeting on Mathematics and Computation, Supercomputing, Reactor Physics and Nuclear and Biological Applications, September 12-15, Avignon, France. 12 p.

Miettinen, J. & Rätty, H., The coupled code TRAB-3D-SMABRE for 3D transient and accident analyses. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 38 – 45. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Ranta-aho, A., Isotopic composition and criticality safety calculation system at VTT. 10th Meeting of the AER Working Group E entitled Physical Problems on Spent Fuel, Radwaste and Decommissioning of Nuclear Power Plants, April 18-20, 2005, Villa Szondra by Modra, Slovakia. 14 p.

Syrjälähti, E. & Hämäläinen, A., HEXTRAN-SMABRE calculation of the VVER-1000 coolant transient benchmark. 11th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH 11), October 2-6, 2005, Avignon, France.

Research institute reports

Daavittila, A., Höglund, R., Kaloinen, E., Kotiluoto, P., Miettinen, J., Rajamäki, M. & Rätty, H., Status of the reactor analysis code development within the EMERALD project at the end of 2004, VTT Processes, Project report PRO1/P1001/05, 19.1.2005, 18 p.

Höglund, R. (ed.), Status of the reactor analysis code development within the EMERALD project at the end of 2005, VTT, Research report VTT-R-1033-06, 31.1.2006, 11p. + app. 12 p.

Inkinen, P., 3D-dynamiikkaohjelmien tulosten visualisointi Matlabilla, VTT Processes, Project report PRO1/P1017/05, 24.8.2005, 21 p. + app. 2 p. (In Finnish).

Kaloinen, E., Input instructions of HEXBU-3D/MOD5&6, VTT Processes, Project report PRO1/P1027/05, 21.12.2005, 32 p.

Miettinen, J. & Rätty, H., Status of the EMERALD subtask for coupling of TRAB-3D and SMABRE, VTT, Research report VTT-R-00982-06, 31.1.2006, 9 p.

Pusa, M., Reaktorifysikaaliset herkkyy- ja epävarmuusmenetelmät, VTT Processes, Project report PRO1/P1028/05, 30.12.2005, 51 p. + app. 5 p. (In Finnish).

Ranta-Aho, A., PWR-UO₂ assembly: study of control rods effects on spent fuel composition, VTT Processes, Project report PRO1/P1002/05, 11.1.2005, 37 p.

Syrjälähti, E., Development of the HEXTRAN program in connection with the VVER-1000 coolant transient benchmark, VTT Processes, Project report PRO1/P1004/05, 14.1.2005, 9 p.

Syrjälähti, E., New sensitivity analysis tool for the reactor dynamics codes, VTT Processes, Project report PRO1/P1016/05, 6.6.2005, 9 p. + app. 26 p.

Syrjälähti, E., Reaktoridynamiikkaohjelmien polttoainemallien kehittäminen, VTT Processes, Project report PRO1/P1019/05, 26.8.2005, 5 p. (In Finnish).

Papers in review or in print

Syrjälähti, E. & Hämäläinen, A., HEXTRAN-SMABRE calculation of the VVER-1000 coolant transient benchmark-1. Progress in Nuclear Energy. To be published.

High-burnup upgrades in fuel behaviour modelling (KORU)

Kelpe, S. J., KORU project summary report. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 46 – 51. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Knuutila, A., Improvements on FRAPCON/FRAPTRAN mechanical modelling. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 52 – 58. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Others

Kekkonen, L., Validation of the Fission Gas Release Model of the advanced IMAGINE Code Implemented in the ENIGMA Fuel Performance Code. M.Sc. Thesis. Helsinki University of Technology – Department of Engineering Physics and Mathematics, Espoo 20.12.2005. 68 p.

Integrity and life time of reactor circuits (INTELI)

Scientific publications

Heerens, J., Ainsworth, R.A., Moskvic, R., Wallin, K. Fracture toughness characterisation in the ductile-to-brittle transition and upper shelf regimes using pre-cracked Charpy single-edge bend specimen. *Pressure Vessels and Piping* 82(2005) 649-667. (INSEL)

Vepsä, A., Haapaniemi, H., Luukkanen, P., Nurkkala, P., Saarenheimo, A. Application of finite element model updating to a feed water pipeline of a nuclear power plant. *Nuclear Engineering and Design* 235 (2005) 1849 - 1865. (INPUT)

McCabe, D.E., Merkle, J.G., Wallin, K. An Introduction to the Development and Use of the Master Curve Method. *Fatigue and Fracture, Manual 52*. ISBN:0-8031-3368-5, Stock#:MNL52. (INSEL)

Conference papers

Aaltonen, P. Yagodzinskyy, Y., Hänninen, H. Effects of Straining on Oxide Films and Passivity on Copper in Nitrite Solution at Ambient Temperature. *Passivity-9, The Ninth international Symposium on the Passivation of Metals and Semiconductors and the Properties of Thin Oxide Layers*. EFC Event n 281, Paris, France, June 27-July 1, 2005 (INCOM)

Ehrnstén U., Ivanchenko M., Nevdacha V., Yagodzinskyy Y, Toivonen A., Hänninen H. DYNAMIC STRAIN AGEING AND EAC OF DEFORMED NITROGEN-ALLOYED AISI 316 STAINLESS STEELS. 12th International Conference on Environmental Degradation of Materials in Nuclear Systems - Water Reactors. August 14-18, 2005, Snowbird Resort, Salt Lake City, Utah, USA. (INSEL)

Karlsen, W., Aaltonen, P. Description of Mechanical Behavior of Irradiated Stainless Steel. Deliverable (D-No: C16). **Confidential**, 1.7.2005. (INPERF)

Roth, Armin; Devrient, Bastian; Gómez-Briceno, Dolores; Lapena, Jesus; Ernestova, Miroslava; Zamboch, Miroslav; Ehrnstén, Ulla; Föhl, Jürgen; Weissenberg, Thomas; Scifert, Hans-Peter; Ritter, Stefan. The effect of transients on the crack growth behavior of low alloy steels for pressure boundary components under light water reactor operating conditions. 12th International Conference on Environmental Degradation of Materials in Nuclear Power - Water Reactors. August 14-18, 2005, Snowbird Resort, Salt Lake City, Utah, USA. (INSEL)

Serén, T., Wasastjerna, F. Extensive revision of the Kernel-based PREVIEW program and its input data. 12th Int. Symposium on Reactor Dosimetry. Gatlinburg, Tennessee, USA. 7.-13.5.05 (INSEL)

Toivonen, A., Ehrnstén, U., Karlsen, W., Aaltonen, P., Massoud, J-P., Boursier, J-M. Fractographic Observations on a Highly Irradiated AISI 304 Steel after Constant Load Tests in Simulated PWR Water and Argon and after Supplementary Tensile and Impact Tests. 12th International Conference on Environmental Degradation of Materials in Nuclear Systems - Water Reactors. August 14-18, 2005, Snowbird Resort, Salt Lake City, Utah, USA. (INSEL)

Wallin, K., Keim, E., Bugat, S., Diard, O., Marini, B., Viehrig, H-W. PERFECT (Prediction of irradiation damage effects in reactor components): Overview of RPV Mechanics Sub-Project. Proceedings of ASME PVP 2005. ASME Pressure Vessel and Piping Division Conference. Denver, Colorado, USA. 17.-21.7.05 (INSEL)

Wallin, K. & Rintamaa, R. Use of the Master Curve Methodology for Real Three Dimensional Cracks. SMiRT 18, 18th Int. Conference on Structural Mechanics in Reactor Technology. Beijing, China. 7.-12.8.05 (INSEL)

Yagodzinsky, Y., Aaltonen, P., Hänninen, H. Electrochemical Potential Oscillations during Galvanostatic Passivation of Copper in NaNO₂ Solutions and Their Role in R`TGSCC Mechanism. Passivity-9, The Ninth international Symposium on the Passivation of Metals and Semiconductors and the Properties of Thin Oxide Layers. EFC Event n 281, Paris, France, June 27-July 1, 2005. (INCOM)

Kauppinen, P., Cronvall, O., Sarkimo, M., Pättikangas, T., Bojinov, M., Kinnunen, P. & Saario, T. INTELI summary report. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 59 – 67. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Laukkanen, A. & Wallin, K. Constraint corrected fracture mechanics in structural integrity assessment.. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 52 – 67. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Solin, J., Karjalainen-Roikonen, P., Arilahti, E. & Moilanen, P. Fatigue behaviour of 316 NG stainless steel in EPR primary circuit conditions. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 76 – 88. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Research Institute Reports

Hakkarainen, T. Pitch-and-catch –tekniikan soveltuvuus virheiden koon määritykseen ja raekohinan havaitsemiseen. VTT Research report VTT-S-00780-06. 13 p. (in Finnish)

Karlsen, W., Nenonen, P. FEG-STEM Study of the 30 dpa CHOOZ A 304 SS. VTT Research Report VTT-R-01699-06 (INSEL)

Kinnunen, P. Corrosion - water chemistry interaction studies in the INTELI-project in 2005. VTT Research Report TUO75-056404. (INPUT)

Pelli, R. Literature review on pressurisers. VTT Research Report VTT-R-01658-06. (INCOM)

Sarajärvi, U, Cronvall, O. Simulation and analysis of data for enhancing low cycle fatigue test procedures. VTT Research Report TUO72-056604 (INPUT).

Sarkimo, M. Comparison of ultrasonic echo amplitudes from computer simulation and experimental measurements when different tilt and skew angles are applied. VTT Research Report BTUO77-051398. 20 p. (INPUT)

Vepsä, A. Vibration study of a secondary feed water pipeline RL61 of the Loviisa nuclear power plant.. VTT Research Report VTT-R-00712-06. (INPUT)

Papers in review or in print

Wallin, K., Laukkanen, A. Aspects of cleavage fracture initiation. Fataigue & Fracture of Engineering Materials & Structures. To be published in 2006. (INSEL)

LWR oxide model for improved understanding of activity build-up and corrosion phenomena (LWROXI)

Scientific publications

Bojinov, M., Kinnunen, P., Lundgren, K., Wikmark, G. A Mixed-Conduction Model for the Oxidation of Stainless Steel in a High-temperature Electrolyte - estimation of kinetic parameters of oxide layer growth and restructuring. *Journal of the Electrochemical Society*, 152(7) B250-B261 (2005)

Conference papers

Martin Bojinov, Petri Kinnunen, Klas Lundgren and Gunnar Wikmark: Passive film growth and oxide layer restructuring on stainless steel in a high-temperature borate electrolyte, PASSIVITY-9, the 9th International Symposium on the Passivation of Metals and Semiconductors, and the Properties of Thin Oxide Layers, June 27 - July 1, 2005, Paris, France.

Bojinov, M. & Kinnunen, P. Kinetics of the growth and restructuring of the oxide layer on stainless steel in a light water reactor coolant. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 89 – 98. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Research institute reports

Bojinov, M., Kinnunen, V., Lehtovuori, T., Saario, G. A conceptual four-layer model of the oxide layer on structural materials in LWRs with emphasis on the oxide-coolant interactions, Research report No. BTUO75-056405, VTT Industrial Systems, 25 p.

**Safety Management of Concrete Structures in Nuclear Power Plants
(CONSAFE)**

No publications in 2005.

Concrete Technological Studies Related to the Construction, Inspection and Repairation of the Nuclear Power Plant Structures (CONTECH)

Conference papers

Kuosa, H., Laukkanen, K., Pitkänen, P., Salparanta, L. & Vesikari, E. CONTECH summary report. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 105 – 109. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Research institute reports

L. Salparanta, Betonin hiekkapuhallus vettähylykivää impregnointia ja tiivistystä varten. Tutkimusselostus. RTE3253/05. 18.10.2005. 5 s. (In Finnish).

L. Salparanta, Betonin suoja-aineiden SILKO-hyväksymiskokeet. Tutkimusselostus Nro RTE2206/05. 3.6.2005. 20s + liitt. 4 s. (In Finnish).

P. Pitkänen, Muotoiluvalun ongelmat ja laatuvaatimukset: Tutkimusselostus. Nro VTT-S-02259-06. 2.3.2006. 27 s. (In Finnish)

Others

Betonin suoja-aineiden SILKO-kokeet. VTT. Espoo 2004. 17 s. (In Finnish).

SILKO-tests of protective agents for concrete. VTT Espoo 2004. 16 s.

Kuivatuotebetonit, paikkauslaastit, paikkausmassat, juotoslaastit, juotosmassat, tasoitteet, kuivatuoteruiskubetonit ja ejektorilaastit – SILKO-kokeet. VTT. Espoo 2005. 9 s. (In Finnish).

Pre-mixed dry concretes, patch mortars and mastics, jointing grouts and mastics, screeds, pre-mixed dry shotcretes and air-blown mortars - SILKO-tests. VTT. Espoo 2005. 9 s.

Lisälehti julkaisuun Tiehallinnon selvityksiä 60/2001. 11 s + liitt. 10 s. (In Finnish).

Papers in review or in print

Nestemäisten kalvon muodostavien jälkihoitoaineiden laatuvaatimukset ja todentamismenetelmät. Tutkimusselostusluonnos. 4.11.2005. (In Finnish)

**Coupled Thermo hydraulics and Structural Mechanics
(MULTIPHYSICS)**

Conference papers

Lestinen, V., Timperi, A. & Pättikangas, T. The integration of thermal-hydraulics (CFD) and structural analysis (FEM) computer codes in liquid and solid mechanics. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 124 – 131. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Research institute reports

Timperi, A., Pättikangas, T., Hänninen, M., Joint CFD-FEM Calculations of Pressure Transient in LBLOCA Using APROS, Star-CD and ABAQUS, VTT Research Report TUO72-056661, (2005), 67 p.

Papers in review or in print

Lestinen, V., Joint CFD-FEM Calculations of Pressure Transient in LBLOCA Using FLUENT and ABAQUS, Fortum Nuclear Services Ltd., TERMO-515, (2006).

Development of APROS Containment Model (TIFANY)

Conference papers

Salminen, K. TIFANY summary report. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 132 – 139. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Research institute reports

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Poikolainen, J., Silde, A., Validation of the containment water pool stratification model of APROS against the POOLEX experiments STB-20 and STB-21. VTT Processes Project Report PRO1/P1020/06. 28 p.

Thermal hydraulic analysis of nuclear reactors (THEA)

Scientific publications

Scheuerer, M., Heitsch, M., Menter, F., Egorov, Y., Toth, I., Bestion, D., Pigny, S., Paillere, H., Martin, A., Boucker, M., Krepper, E., Willemsen, S., Muhlbauer, P., Andreani, M., Smith, B., Karlsson, R., Henriksson, M., Hemstrom, B., Karppinen I. and Kimber, G. (2005) "Evaluation of computational fluid dynamic methods for reactor safety analysis (ECORA)", Nuclear Engineering and Design, Vol. 235 (2-4), pp. 359-368.

Conference papers

Miettinen Jaakko, The Prediction of the LWR Plant Accident Based on the Measured Plant Data, ICONE-13-50823, Beijing, China, May 16-20, 2005

Tuomainen, M. THEA summary report. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 140 – 146. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Poikolainen, J. Simulation of the PACTEL non-condensable experiments with APROS 5.04. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 147 – 152. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Research institute reports:

Takasuo Eveliina, An Assessment of the TRACE V4.160 Code against the PACTEL ATWS-10 - 13 And ATWS-20 - 21 Pressurizer Experiments, PRO1-53T-05 (funded by Fortum and TVO)

Yrjölä Vesa, Holmström Heikki, Assesment of the RELAP5/mod3.2.2 code against the PACTEL steam generator collector rapture experiments PSL-10 and PSL-11, CAMP International Assessment Report, November 2005 (funded outside the THEA project)

Junninen Pasi, Simulating the Test PKL E3.1 with APROS, PRO1/P1029/05
29 p, 16.2.2006

Others:

Junninen Pasi, Laskentamalli PKL-koelaitteiston pienen vuodon kokeen simuloimiseksi APROS ohjelmalla, Diplomityö, STUK-YTO-TR 214, elokuu 2005 (funded by STUK)

Takasuo Eveliina, Modelling of pressurizer using APROS and TRACE thermal hydraulic codes, Master's thesis, Lappeenranta University of Technology, Department of Energy and Environmental Technology, 17.11.2005

Papers in review or in print

Huhtanen Risto, Niemi Jarto, Simulation of condensation on MISTRA facility using Fluent code, PRO1/P1030/05, 25 p. 28.2.2006.

Archiving experiment data (KOETAR)

Conference papers

Riikonen, V. KOETAR summary report. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 194 – 198. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Condensation pool experiments (POOLEX)

Conference papers

Purhonen, H., Puustinen, M., Laine, J., Räsänen, A., Kyrki-Rajamäki, R., Vihavainen, J., Steam Blowdown Experiments with the Condensation Pool Test Rig. International Conference Nuclear Energy for New Europe 2005, Bled, Slovenia, September 5-8, 2005, 10 p.

Puustinen, M. & Laine, L. Condensation pool experiments with steam injection. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 199 – 206. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Research institute reports

Laine, J., Puustinen, M., Thermal Stratification Experiments with the Condensation Pool Test Rig. Lappeenranta: Lappeenranta University of Technology, Nuclear Safety Research Unit, Research Report, 2005, 23 p. + app. 8 p. (POOLEX 1/2005).

Laine, J., Puustinen, M., Steam Blowdown Experiments on Chugging. Lappeenranta: Lappeenranta University of Technology, Nuclear Safety Research Unit, Research Report, 2005, 40 p. + app. 7 p. (POOLEX 2/2005).

Laine, J., Puustinen, M., Condensation Pool Experiments with Steam Using Insulated DN200 Blowdown Pipe. Lappeenranta: Lappeenranta University of Technology, Nuclear Safety Research Unit, Research Report, 2005, 17 p. + app. 8 p. (POOLEX 3/2005).

Participation in development of European calculation environment

(ECE)

Others

Riikonen V., Ilvonen M., PTS scenarios for Loviisa VVER-440 PWR, Lappeenranta University of Technology, 2005 (Technical Report NURESIM 1/2005)

Puustinen M., Vihavainen J., Deliverable D2.1.2: Review of the existing data basis for the validation of models for PTS. Condensation Pool Experiment (LUT Data), Lappeenranta University of Technology, 2005 (Technical Report NURESIM 2/2005)

Turtiainen Kristiina. Modelling of a Hydrogen Catalytic Recombiner for Nuclear Power Plant Containment Studies; Case: Siemens FR90/1-150 Recombiner Model in TONUS 0D Code. Lappeenranta 2005. 133 p. + app. 20p. (Lappeenranta University of Technology). MScTech thesis.

Wall response to soft impact (WARSI) and Impact tests (IMPACT)

Conference papers

Saarenheimo, A. WARSI summary report. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 110 – 112. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Kärnä, T. & Saarenheimo, A. IMPACT loaded structures. In: Rätty, H. & Puska, E.-K. (eds.). SAFIR, The Finnish Research Programme on Nuclear Power Plant Safety 2003 – 2006, Interim Report, VTT Research Notes 2272. VTT Processes. Espoo (2004), p. 113 – 123. ISBN 951-38-6515-0, ISSN 1235-0605, <http://virtual.vtt.fi/inf/pdf/tiedotteet/2004/T2272.pdf>.

Research institute reports

Saarenheimo, A., Aalto, A., Calonius, K., Hakola, I., Hostikka, S., Kankkunen, A., Kärnä, T., Silde, A. & Tuomala, M. Numerical studies for impact tests. VTT Industrial Systems, Research report BTUO72-051408, 27.2.2006, 81 p.

Severe accidents and nuclear containment integrity (SANCY)

Conference Papers

Lindholm, I., Athken, K., Bürger, M., Fichot, F., Park, S., In-Vessel Retention: On Going Activity on In-Vessel Core and Debris Coolability, Seminar ERMSAR First European Review Meeting on Severe Accident Research , 14-16 November, 2005, Aix en Provence, France.

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