**Aaron J. Wysocki**

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I am an R&D staff member at Oak Ridge National Laboratory with a Ph.D. in Nuclear Engineering. My areas of expertise include reactor thermal hydraulics, nuclear systems, reactor safety analysis, BWR stability, advanced reactors, accident tolerant fuel (ATF), coupled TH/neutronics simulations, and code development.

**EDUCATION**

**Doctor of Philosophy in Nuclear Engineering,** January 2015

University of Michigan – Ann Arbor, Michigan

Final GPA: 4.00/4.0

**Bachelor of Science in Nuclear Engineering,** August 2008

University of Florida – Gainesville, Florida

Final GPA: 3.93/4.0; Summa cum laude

**EMPLOYMENT**

**Thermal Hydraulics Safety Analyst/Code Developer**, October 2017 – present

Oak Ridge National Laboratory – Oak Ridge, Tennessee

**Postdoctoral Research Associate,** August 2015 – September 2017

Oak Ridge National Laboratory – Oak Ridge, Tennessee

**SELECTED RESEARCH EXPERIENCE**

Oak Ridge National Laboratory: August 2015 – present

* Performed TRACE analyses to assess the fuel rod conditions during LOCA for extended burnup fuel as part of a joint VERA-TRACE-BISON effort to characterize fission fragment relocation and dispersal (FFRD) susceptibility.
* Activities within the TCR program included: leading the reactor safety analysis team, utilizing systems analysis codes (TRACE, RELAP5-3D) to determine the TCR system behavior under anticipated accident scenarios; and performing core thermal hydraulic analyses to inform the system design and optimization efforts.
* Performed code development for the CTF core thermal hydraulics code, including code validation and verification, model enhancement, support for ATF and advanced reactor designs, and coupled CTF/neutronic/systems-code transient capabilities.
* Performed code development for TRACE, RELAP5-3D, and PARCS to extend the fluid and heat transfer models for molten salt, LWR, and advanced reactor applications.
* Created and applied TRACE, RELAP5-3D, PARCS, and CTF models for a variety of advanced reactor applications, including modeling of the ORNL Liquid Salt Test Loop (LSTL), FHR Demonstration Reactor, Molten Salt Reactor Experiment (MSRE), TCR, and VTR MSR Experimental Vehicle
* Applied TRACE, RELAP5-3D, and PARCS to analyze the behavior of conventional and accident tolerant fuel (ATF) under steady-state and transient conditions such as RIA, loss of coolant accident (LOCA), and main steam line break (MSLB).
* Assisted the NRC Office of Nuclear Regulation in reviewing codes and methodologies for several BWR license amendment requests in extended flow domains, including presenting technical evaluations to the advisory committee on reactor safeguards (ACRS).

University of Michigan: August 2009 – August 2015

* Developed and applied a computed tomography technique for detection of 3D void distribution in upward two-phase flow in pipe and fuel lattice geometries.
* Furthered the understanding of BWR instability phenomena, including novel studies and physical insights into rotating mode limit cycle oscillations supported by TRACE/PARCS and reduced-order analyses.
* Aided in the creation of the OECD Oskarshamn-2 1999 BWR Stability Event Benchmark and simulated this event in TRACE/PARCS
* Served as lead developer of the U.S. NRC depletion/TH code PATHS (Purdue Advanced Thermal Hydraulic Simulator), implementing numerous code improvements and performing experimental validation.
* Created full-core coupled PARCS/PATHS models and validated against operational data and other codes (TRACE/PARCS, SIMULATE) for multiple BWRs: Oskarshamn NPP, Peach Bottom NPP, Cofrentes NPP, and the ABWR.

**PEER-REVIEWED JOURNAL PUBLICATIONS**

Salko, Robert K., **Wysocki, Aaron J.**, Blyth, Taylor S., et al., "CTF: a modernized, production-level, thermal hydraulic solver for the solution of industry-relevant challenge problems in pressurized water reactors," *Nuclear Engineering and Design* 397 (2022).

Ade, Brian J., Betzler, Benjamin R., **Wysocki, Aaron J.**, Greenwood, Michael S., Chesser, Phillip C., Terrani, Kurt A., Jain, Prashant K., Burns, Joseph R., Hiscox, Briana D., Rader, Jordan D., Heineman, Jesse J. W., Heidet, Florent, Bergeron, Aurelien, Sterbentz, James W., Holschuh, Tommy V., Brown, Nicholas R., and Kile, Robert F., "Candidate Core Designs for the Transformational Challenge Reactor," *Journal of Nuclear Engineering* 2(1): 74-85 (2021).

Borowiec, Katarzyna, **Wysocki, Aaron J.**, and Kozlowski, Tomasz, "Comprehensive framework for data-driven model form discovery of the closure laws in thermal-hydraulics codes," *International Journal of Heat and Mass Transfer* 170: 120976 (2021).

Capps, Nathan A., **Wysocki, Aaron J.**, Godfrey, Andrew T., Collins, Benjamin S., Sweet, Ryan T., Brown, Nicholas R., Lee, Soon K., Szewczyk, Nicholas, and Hoxie-Key, Susan, "Full core LOCA safety analysis for a PWR containing high burnup fuel," *Nuclear Engineering and Design* 379: 111194 (2021).

Kile, Robert F., **Wysocki, Aaron J.**, Betzler, Benjamin R., and Brown, Nicholas R., "Transformational challenge reactor analysis to inform preconceptual core design decisions: Sensitivity study of transient analysis in a hydride-moderated microreactor," *Nuclear Engineering and Design* 376: 111122 (2021).

Betzler, Benjamin R., Ade, Brian J., **Wysocki, Aaron J.**, Jain, Prashant K., Chesser, Phillip C., Greenwood, Michael S., and Terrani, Kurt A., "Transformational Challenge Reactor preconceptual core design studies," *Nuclear Engineering and Design* 367: 110781 (2020).

Gorton, Jacob P., Collins, Benjamin S., **Wysocki, Aaron J.**, and Brown, Nicholas R., "Assessment of CASL VERA for BWR analysis and application to accident tolerant SiC/SiC channel box," *Nuclear Engineering and Design* 365: 110732 (2020).

Borowiec, Katarzyna, **Wysocki, Aaron J.**, Shaner, Samuel, Greenwood, Michael S., and Ellis, Matthew, "Increasing revenue of nuclear power plants with thermal storage," *Journal of Energy Resources Technology* 142(4): 042006 (2019).

Munoz-Cobo, José-Luis., Miró, Rafael, **Wysocki, Aaron J.**, and Soler, Amparo, "3D calculation of the lambda eigenvalues and eigenmodes of the two-group neutron diffusion equation by coarse-mesh nodal methods," *Progress in Nuclear Energy* 110: 393-409 (2019).

Zhao, Xingang, **Wysocki, Aaron J.**, Shirvan, Koroush, and Salko, Robert K., "Assessment of the Subchannel Code CTF for Single- and Two-Phase Flows," *Nuclear Technology* 205(1-2): 338-351 (2019).

**Wysocki, Aaron J.**, Manera, Annalisa , Downar, Thomas J., and March-Leuba, José, "Investigation of rotating mode behavior in BWR out-of-phase limit cycle oscillations – Part 1: Reduced order model," *Annals of Nuclear Energy* 122: 393-407 (2018).

**Wysocki, Aaron J.**, Manera, Annalisa, Downar, Thomas J., and March-Leuba, José, "Investigation of rotating mode behavior in BWR out-of-phase limit cycle oscillations – Part 2: TRACE/PARCS model and physical explanation," *Annals of Nuclear Energy* 122: 378-392 (2018).

Avigni, Pietro, **Wysocki, Aaron J.**, and Yoder, Graydon L., "Liquid Salt Test Loop modeling using TRACE," *Annals of Nuclear Energy* 106: 170-184 (2017).

Brown, Nicholas R., Betzler, Benjamin R., Carbajo, Juan J., **Wysocki, Aaron J.**, Greenwood, M. Scott, Gentry, Cole, and Qualls, A. Louis, "Preconceptual design of a fluoride high temperature salt-cooled engineering demonstration reactor: Core design and safety analysis," *Annals of Nuclear Energy* 103: 49-59 (2017).

Brown, Nicholas R., **Wysocki, Aaron J.**, Terrani, Kurt A., Xu, Kevin G., and Wachs, Daniel M., "The potential impact of enhanced accident tolerant cladding materials on reactivity initiated accidents in light water reactors," *Annals of Nuclear Energy* 99: 353-365 (2017).

Qualls, A. Louis, Betzler, Benjamin R., Brown, Nicholas R., Carbajo, Juan J., Greenwood, M. Scott, Hale, Richard, Harrison, Thomas J., Powers, Jeffrey J., Robb, Kevin R., Terrell, Jerry, **Wysocki, Aaron J.**, Gehin, Jess C., and Worrall, Andrew, "Preconceptual design of a fluoride high temperature salt-cooled engineering demonstration reactor: Motivation and overview," *Annals of Nuclear Energy* 107: 144-155 (2017).

**Wysocki, Aaron J.**, Ward, Andrew , Manera, Annalisa, Downar, Thomas J., Xu, Yunlin, March-Leuba, José, Thurston, Carl, Hudson, Nathanael, and Ireland, Andrew, "The Modeling of Advanced BWR Fuel Designs with the NRC Fuel Depletion Codes PARCS/PATHS," *Nuclear Technology* 190(3): 323-335 (2015).

Kozlowski, Tomasz, **Wysocki, Aaron J.**, Gajev, Ivan, Xu, Yunlin, Downar, Thomas J., Ivanov, Kostadin, Magedanz, Jeffrey, Hardgrove, Matthew, March-Leuba, José, Hudson, Nathanael, and Ma, Weimin, "Analysis of the OECD/NRC Oskarshamn-2 BWR stability benchmark," *Annals of Nuclear Energy* 67: 4-12 (2014).

**Wysocki, Aaron J.**, March-Leuba, José, Manera, Annalisa, and Downar, Thomas J., "TRACE/PARCS analysis of out-of-phase power oscillations with a rotating line of symmetry," *Annals of Nuclear Energy* 67: 59-69 (2014).

**CONFERENCE PROCEEDINGS**

Ade, Brian J., Betzler, Benjamin R., **Wysocki, Aaron J.**, Weinmeister, Justin R., See, Nathan D., Jain, Prashant K., Kirkland, William M., Burns, Joseph R., Hiscox, Briana D., Schappel, Daniel P., Talamo, A., Bergeron, Aurelien, and Jessee, Casey J., "Transformational Challenge Reactor design characteristics," in *PHYSOR22*, Oak Ridge, Tennessee, U.S.A. (2022).

**Wysocki, Aaron J.**, Salko Jr, Robert K., and Arshavsky, Igor, "Coupling of CTF and RELAP5-3D within an enhanced fidelity nuclear power plant simulator," in *NURETH-19*, Brussels, Belgium (2022).

Ade, Brian J., Betzler, Benjamin R., **Wysocki, Aaron J.**, Greenwood, Michael S., Chesser, Phillip C., Terrani, Kurt A., Jain, Prashant K., Burns, Joseph R., Hiscox, Briana D., Rader, Jordan D., Heineman, Jesse J. W., Heidet, Florent, Bergeron, Aurelien, Sterbentz, James W., Holschuh, Tommy V., Brown, Nicholas R., and Kile, Robert F., "Candidate core designs for the Transformational Challenge Reactor," in *PHYSOR 2020*, Cambridge, U.K. (2020).

Betzler, Benjamin R., Ade, Brian J., **Wysocki, Aaron J.**, Chesser, Phillip C., Greenwood, Michael S., Wang, Peter L., See, Nathan D., Hu, Xunxiang, and Terrani, Kurt A., "Design downselection for the Transformational Challenge Reactor," in *2020 Virtual ANS Meeting*, 122(1): 769-772 (2020).

Betzler, Benjamin R., Ade, Brian J., **Wysocki, Aaron J.**, Chesser, Phillip C., and Terrani, Kurt A., "Transformational Challenge Reactor agile design enabled by additive manufacturing," in *2020 ANS Virtual Winter Meeting*, 123(1): 1434-1437 (2020).

Betzler, Benjamin R., Ade, Brian J., **Wysocki, Aaron J.**, Greenwood, Michael S., Heineman, Jesse J. W., Chesser, Phillip C., Jain, Prashant K., Heidet, Florent, and Bergeron, Aurelien, "Advanced Manufacturing for Nuclear Core Design," in *PHYSOR2020*, Cambridge, U.K. (2020).

Betzler, Benjamin R., Ade, Brian J., **Wysocki, Aaron J.**, Jain, Prashant K., Greenwood, Michael S., Rader, Jordan D., Heineman, Jesse J. W., Kile, Robert F., Brown, Nicholas R., and Terrani, Kurt A., "Power level downselection for the Transformational Challenge Reactor," in *2020 ANS Virtual Meeting*, 122(1): 773-776 (2020).

Kile, Robert F., Schappel, Daniel P., **Wysocki, Aaron J.**, Vasudevamurthy, Gokul, Terrani, Kurt A., and Brown, Nicholas R., "Informing transient testing of fuel designs for the Transformational Challenge Reactor," in *2020 Virtual ANS Meeting*, 122(1): 236-238 (2020).

**Wysocki, Aaron J.**, Hu, Jianwei, Salko, Robert K., and Kochunas, Brendan M., "Improvement of CTF for RIA Analysis," in *CASL Technical Symposium*, Oak Ridge, Tennessee, U.S.A. (2020).

**Wysocki, Aaron J.**, Jain, Prashant K., and Rader, Jordan D., "Transformational Challenge Reactor accident analysis," in *2020 ANS Virtual Winter Meeting*, 123(1): 1638-1641 (2020).

Rader, Jordan D., Greenwood, Michael S., Melin, Alexander, **Wysocki, Aaron J.**, Borza, Greg, and Lietwiler, Clay, "Linear stability studies of a natural circulation-based small modular reactor," in *NPIC&HMIT 2019*, Orlando, FL, USA, American Nuclear Society 11: 765-775 (2019).

Collins, Benjamin S., Galloway, Jack, Salko, Robert K., Clarno, Kevin, **Wysocki, Aaron J.**, Okhuysen, Brett, and Andersson, Anders David, "Whole core crud-induced power shift simulations using VERA," in *PHYSOR 2018*, Cancun, Mexico (2018).

Kucukboyaci, Vefa N., Kochunas, Brendan, Downar, Thomas J., **Wysocki, Aaron J.**, and Salko, Robert K., "Evaluation of VERA-CS transient capability for analyzing the AP1000 reactor control rod ejection accident," in *PHYSOR 2018*, Cancun, Mexico (2018).

Zhao, Xingang G., **Wysocki, Aaron J.**, Salko, Robert K., and Shirvan, Koroush, "Mechanistic modeling of departure from nuclear boiling under transient scenarios," in *ICAPP 2018*, Charlotte, North Carolina, U.S.A., American Nuclear Society (2018).

Collins, Benjamin S., Gentry, Cole, **Wysocki, Aaron J.**, and Salko, Robert K., "Molten salt reactor simulations using MPACT-CTF," in *2017 ANS Annual Meeting*, San Franciso, California, U.S.A., American Nuclear Society 116(1): 1170-1173 (2017).

Collins, Benjamin S., Gentry, Cole A., **Wysocki, Aaron J.**, and Salko, Robert K., "Recent advancements in liquid and solid molten salt reactors--I: Molten salt reactor simulations using MPACT-CTF," in *2017 ANS Meeting*, San Franciso, California, U.S.A., American Nuclear Society 116: 1170-1173 (2017).

Salko, Robert K., **Wysocki, Aaron J.**, Collins, Benjamin S., Avramova, Maria N., and Gosdin, Chris, "Development and assessment of CTF for pin-resolved BWR modeling," in *M&C 2017*, Jeju, South Korea (2017).

**Wysocki, Aaron J.** and Salko, Robert K., "Validation of CTF droplet entrainment and annular/mist closure models using Riso steam/water experiments," in *2017 ANS Annual Meeting*, San Franciso, California, U.S.A., American Nuclear Society 116: 1271-1274 (2017).

Zhao, Xingang G., Shirvan, Koroush, Salko, Robert K., and **Wysocki, Aaron J.**, "Validation and benchmarking of CTF for single- and two-phase flow," in *NURETH-17*, Xi'an, China (2017).

Brown, Nicholas R., **Wysocki, Aaron J.**, and Terrani, Kurt A., "Reactivity-initiated accident simulation to inform transient testing of candidate advanced cladding," in *Top Fuel 2016*, Boise, Idaho, U.S.A., American Nuclear Society: 271-285 (2016).

**Wysocki, Aaron J.**, Brown, Nicholas R., Terrani, Kurt A., and Wachs, Daniel M., "Potential impact of cladding wettability on LWR transient progression," in *2016 ANS Winter Meeting*, American Nuclear Society 115: 473-477 (2016).

**Wysocki, Aaron J.**, Manera, Annalisa, Downar, Thomas J., and March-Leuba, José, "A physical mechanism for rotating lines of symmetry in BWR out-of-phase limit cycle oscillations," in *NURETH-16*, Chicago, Illinois, U.S.A., American Nuclear Society: 4784-4797 (2015).

Hall, Andrew C., Downar, Thomas J., Ward, Andrew, Jarret, Michael, **Wysocki, Aaron J.**, Xu, Yunlin, and Shirvan, Koroush, "Advanced methods development for equilibrium cycle calculations of the RBWR," in *ICAPP 2014*, Charlotte, North Carolina, U.S.A. (2014).

**Wysocki, Aaron J.**, March-Leuba, José, Thurston, Carl, Ward, Andrew, Manera, Annalisa, Xu, Yunlin, and Downar, Thomas J., "The modeling of advanced BWR fuel designs with the US NRC fuel depletion codes PARCS/PATHS," in *Proc. of the International Topical Meeting on Advances in Thermal-Hydraulics (ATH '14)*, Reno, Nevada, U.S.A., American Nuclear Society (2014).

Kozlowski, Tomasz, Downar, Thomas J., Xu, Yunlin, **Wysocki, Aaron J.**, Ivanov, Kostadin, Magedanz, Jeffrey, Hardgrove, Matthew, March-Leuba, José, Hudson, Nathanael, and Woodyatt, Diana, "TRACE/PARCS analysis of the OECD/NEA Oskarshamn-2 BWR stability benchmark," in *PHYSOR 2012*, Knoxville, Tennessee, U.S.A. (2012).

**Wysocki, Aaron J.**, Ahmed, Bobby, Charmeau, Anne, and Anghaie, Samim, "Validation of CFD modeling for VGM loss-of-forced-cooling accidents," in *International Congress on Advances in Nuclear Power Plants (ICAPP 2009)*, Tokyo, Japan (2009).

**TECHNICAL REPORTS**

Panicker, Nithin , Kucinski, Nicholas, **Wysocki, Aaron J.**, Swinney, Mathew, and Davidson, Gregory, "Validation of thermohydraulic simulations using RELAP for critical dual purpose canisters," ORNL/TM-2022/2627, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2022).

Swinney, Mathew, Panicker, Nithin, Davidson, Gregory, Kucinski, Nicholas, and **Wysocki, Aaron J.**, "Development of coupled simulations for critical dual-purpose canisters in a saturated repository," ORNL/SPR-2022/2624, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2022).

Ade, Brian J., Weinmeister, Justin R., Fountain, Eliott J., **Wysocki, Aaron J.**, See, Nathan D., Schappel, Daniel P., Betzler, Benjamin R., and Jessee, Casey J., "Iterative design incorporating as-built tolerances from additive manufacturing of metal and ceramic structures," ORNL/TM-2021/2248, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2021).

Graham, Aaron M., Henderson, Shane C., Salko, Robert K., **Wysocki, Aaron J.**, and Collins, Benjamin S., "VERA transient capability to support ATF/high burnup fuel/HALEU conversion," ORNL/SPR-2021/2325, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2021).

Salko, Robert K., Abarca, Augustin, and **Wysocki, Aaron J.**, "CTF software requirements, test plan, and test report," CASL-U-2019-1866-002; ORNL/TM-2020/1860, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2021).

Sarsour, Hisham N., Arshavsky, Igor, Collins, Benjamin S., Graham, Aaron M., Salko Jr, Robert K., **Wysocki, Aaron J.**, and Turinsky, Paul, "Fidelity enhancement of nuclear power plant simulators utilizing high fidelity simulation predictions," ORNL/SPR-2021/2033, WSC, Inc., Frederick, Maryland, U.S.A. (2021).

**Wysocki, Aaron J.**, Huning, Alex J., and McDuffee, Joel L., "RELAP5-3D and TRANSFORM analyses for the VTR MSR-EV annular design," ORNL/TM-2021/2116, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2021).

**Wysocki, Aaron J.**, Salko, Robert K., and Collins, Benjamin S., "Coupling of CTF and TRACE for Modeling of Transients," ORNL/TM-2021/2077, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2021).

Betzler, Benjamin R., Ade, Brian J., **Wysocki, Aaron J.**, et al., "Transformational Challenge Reactor conceptual design report," ORNL/SPR-2020/1433; M2TC-20OR0404012; TCR-DA-RPRT-001, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2020).

Betzler, Benjamin R., Ade, Brian J., **Wysocki, Aaron J.**, et al., "Transformational Challenge Reactor Preliminary Core Design Report," ORNL/TM-2020/1718, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2020).

Bhatt, Santosh, Cetiner, Sacit M., Fountain, Eliott, Hilmes, Steven, Muhlheim, Michael D., Petrie, Christian M., Russell, Michael, Varma, Venugopal, and **Wysocki, Aaron J.**, "Transformational Challenge Reactor instrumentation and control system conceptual design report," ORNL/SPR-2020/1547; M2TC-20OR0404015; TCR-IC-RPRT-001, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2020).

Capps, Nathan A., **Wysocki, Aaron J.**, Godfrey, Andrew T., Collins, Benjamin S., Sweet, Ryan T., Brown, Nicholas R., Lee, Soon K., Szewczyk, Nicholas, and Hoxie-Key, Susan, "Full Core LOCA Safety Analysis for a PWR Containing High Burnup Fuel," ORNL/TM-2020/1700, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2020).

Hu, Jianwei, Salko, Robert K., **Wysocki, Aaron J.**, and Collins, Benjamin S., "Improvements to CTFFuel to support ATF concepts," CASL-U-2020-1969-000; ORNL/SPR-2020/1626, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2020).

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**Wysocki, Aaron J.**, Borowiec, Katarzyna, and Salko, Robert K., "L3:PHI.TRN.P19.01 Coupling interface to systems code for transient analysis," CASL-U-2019-1909-000; ORNL/SPR-2019/1429, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2019).

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**Wysocki, Aaron J.** and Salko, Robert K., "Validation of CTF droplet entrainment and annular/mist closure models using Riso steam/water experiments," CASL-U-2016-1080-000; ORNL/SR-2016/434, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (2016).

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