

**BORIS FAYBISHENKO**  
**Staff Scientist**  
**Hydrogeology Department, Earth Sciences Division**  
**E.O. Lawrence Berkeley National Laboratory**

**EDUCATION AND TRAINING:**

*Doctor of Science* (1988), Moscow State University of Environmental Engineering, Moscow, Russia.

*Ph. D* (1977), Institute of Hydraulic Engineers and Land Reclamation, Moscow, Russia.

*B.S. and M.S.* (1970), Hydrogeology and Engineering Geology, Kiev State University, Ukraine.

Annual OSHA (Occupational Safety & Health Administration) training needed to conduct field investigations.

**RESEARCH AND PROFESSIONAL EXPERIENCE:**

*STAFF SCIENTIST, Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California, 04/95 – present. Research Area Vadose Zone Processes and Environmental Remediation, Leader.*

- Field investigations and modeling related to site characterization and remediation of organic, metal, and radioactively contaminated soils and groundwater, as well as nuclear waste disposal sites. PI and Co-PI of projects conducted at the US DOE contaminated sites—Lawrence Berkeley National Laboratory, California; Lawrence Livermore National Laboratory, California; Hanford Reservation, Washington State; Savannah River, Georgia; Yucca Mountain, Nevada, as well as radioactively contaminated and nuclear waste disposal sites in other countries – Ukraine (Chernobyl), Russia (Myak, Karachay Lake, Krasnoyarsk, Tomsk), and Argentina (Ezeiza Nuclear Waste Disposal Site, Areco basin area);
- Modeling of nonlinear dynamics of flow and contaminant transport in soil and groundwater;
- Statistical analysis of the climatic data collected at the AmeriFlux network sites.

*RESEARCH ENGINEER, Department of Materials Science and Mineral Engineering, University of California, Berkeley, California, 02/1991-03/1996. Conducted research on flow and contaminant transport in saturated-unsaturated media, including the design and field monitoring of unsaturated flow and gas transport in organically and radioactively contaminated soils.*

*HEAD OF LABORATORY FOR HYDROGEOLOGICAL AND ENGINEERING GEOLOGY FORECASTING* (1983-1990), *SENIOR RESEARCH SCIENTIST* (1977-1983), *SENIOR ENGINEER, ENGINEER* (1970-1977), *Kiev State University, Kiev, Ukraine.*

**LECTURER:**

University of California, Berkeley, Department of Civil and Environmental Engineering (1998), Graduate course *Vadose Zone Hydrology*;  
Kiev State University, Kiev, Ukraine (1977-1990). Courses *Groundwater Dynamics, Vadose Zone Hydrology, and Hydrogeochemistry.*

**EDITOR:**

*Associate Editor of the Vadose Zone Journal* (2003-2011).

*Guest Co-editor—International Journal Environmental Science and Pollution Research, Special Issue*

No.1 on Chernobyl problem, Dec. 2003.

*Editor* of 2 AGU Monographs on the Dynamics of Flow and Transport in Fractured Rock published in 2000 and 2005.

*Editor* of the AGU-Wiley Monograph “Groundwater Vulnerability: Chernobyl,” in print, 2014.

*Editor* of the AGU-Wiley Monograph “Dynamics of Flow and Transport in Fractured-Porous Media,” 2013-present.

***RECENT INTERNATIONAL ACTIVITIES:***

- Opening keynote presentation at the Remediation Technology (RemTech 2013) Symposium, Canada, October 2013.
- International Atomic Energy Agency (IAEA) Expert Group mission to Chernobyl, Ukraine, and Lead author of the IAEA recommendations on the decommissioning and remediation of the Chernobyl Cooling Pond, October 2009, July 2011, September 2011.
- Member of the Interagency Steering Committee on Multimedia Environmental Models (ISCMEM), Working Group 2 on the assessment of environmental model uncertainty and parameter estimation. The project on the decommissioning and remediation of Chernobyl Cooling Pond as a case study was approved as the 1<sup>st</sup> International ISCMEM project.
- Have directed field and modeling studies of contaminant transport in soil and groundwater at the Ezeiza Nuclear Waste Disposal Site in Argentina.
- Presentation to the JAEA delegation on a comparison of Chernobyl and Fukushima Nuclear Power Plants accidents (October 2013, LBNL).
- Invited presentation at the National Groundwater Association (NGWA) Pillars of Groundwater Innovation Conference (November 2013, Phoenix, AZ)
- Co-Chair of the Organizing Committee of the Complex Soil Systems Conference (Soil Sciences Society SSSA/Bouyoucos, Berkeley Lab, and DOE Conference, September 2014)

*CONSULTING EXPERIENCE:* Witherspoon, Inc., Geological and Petroleum Consultants – 1991-2008; Weiss & Associates; SOMA, Inc. Projects mostly associated with the evaluation of groundwater flow and contaminant transport in soil and groundwater, as well as long-term underground gas storage project.

*Member of Scientific and Professional Societies:* American Geophysical Union, Geological Society of America, Soil Sciences Society of America, National Groundwater Association.

**PUBLICATIONS:** Authored and co-authored over 60 peer-reviewed scientific papers, 12 books and book chapters, over 100 abstracts of scientific presentations, more than 50 reports, and 8 patents. Currently editing 2 books for American Geophysical Union and Wiley Publisher.

***Selected Books and Book Chapters:***

**Faybishenko B, Molz F.** Nonlinear rhizosphere dynamics yields synchronized oscillations of microbial populations, carbon and oxygen concentrations, induced by root exudation, *Procedia Environmental*

*Sciences*, Four Decades of Progress in Monitoring and Modeling of Processes in the Soil-Plant-Atmosphere System: Applications and Challenges, Vol. 19, 681–690, 2013.

**Faybishenko, B.**, Fuzzy-probabilistic calculations of evapotranspiration, In: *Evapotranspiration-Remote Sensing and Modeling*, InTech Open Access Publisher (ISBN 978-953-307-808-3), 2012.

**Faybishenko, B.**, P.A. Witherspoon, and J. Gale (Editors), Dynamics of Fluids and Transport in Fractured Rock, *Geophysical Monograph Series, Vol. 162, 2005*. [ISBN 0-87590-427-0].

**Faybishenko, B.**, G.S. Bodvarsson, P. A. Witherspoon and J. Hinds, Scaling and hierarchy of models for flow processes in unsaturated fractured rock,” Chapter 20 in the book “*Scaling Methods in Soil Physics*” Eds. Y.A. Pachepsky, D.E. Radcliffe and H. M. Selim). CRC Press LLC, pp. 373-417, 2003.

**Faybishenko, B.**, Introduction to modeling of hydrogeologic systems using fuzzy differential equations, In: “Fuzzy Partial Differential Equations and Relational Equations,” (edited by M. Nickravesh, L.A. Zadeh, and V. Korotkikh (Eds.)), Vol. 142, Springer Verlag, the Series *Studies in Fuzziness and Soft Computing*, pp. 267-284, 2003. [ISBN 3-540-20322-2].

**Faybishenko, B.**, P. A. Witherspoon, C. Doughty, J. Geller, T. Wood, and R. Podgorney, Multi-Scale Investigations of Liquid Flow in a Fractured Basalt Vadose Zone, AGU Monograph “*Flow and Transport Through Unsaturated Fractured Rock*,” Second Edition D.D. Evans, T.J. Nicholson, and T. Rasmussen (eds.), 161-182, 2001.

**Faybishenko, B.** Vadose Zone Characterization and Monitoring: Current Technologies, Applications, and Future Developments, Chapter 3 of Book “*Vadose Zone Science and Technology Solutions*,” (eds. B. Looney and R. Falta), Battelle Press, OH, 133-396, 2000.

**Faybishenko, B.**, P.A. Witherspoon and S.M. Benson (eds.), Dynamics of Fluids in Fractured Rock, Geophysical Monograph No. 122, 2000.

**Faybishenko, B.**, and Finsterle, S., Tensiometry in fractured rocks, in Zhang, D., and Winter, C.L., eds., Theory, Modeling, and Field Investigation in Hydrogeology: A Special Volume in Honor of Shlomo P. Neuman’s 60th Birthday: Boulder, Colorado, Geological Society of America Special Paper 348, 161–174, 2000.

Dzekunov, N.E., I.E. Zhernov, and B.A. **Faybishenko**, Thermodynamic Methods of Investigating the Water Regime in the Vadose Zone, Moscow, Nedra, 177 p., 1987.

**Faybishenko, B.A.**, Water-Salt Regime of Soils Under Irrigation, Moscow, Agropromizdat, 304 pp., 1986.

#### ***Selected Peer-reviewed Papers:***

Bea, S.A., Wainwright, H., Spycher, N., **Faybishenko, B.**, Hubbard, S., Denham, M.E., Identifying key controls on the behavior of an acidic-U(VI) plume in the Savannah River Site using reactive transport modeling. *Journal of Contaminant Hydrology*, 2013 Aug;15 1:34-54. doi: 10.1016/j.jconhyd.2013.04.005.

**Faybishenko, B.**, F. Molz, Nonlinear Rhizosphere Dynamics Yields Synchronized Oscillations of Microbial Populations, Carbon and Oxygen Concentrations, Induced by Root Exudation, *Procedia Environmental Sciences*, 2013, 19:369-378.

Molz, F., **B. Faybishenko**, Increasing Evidence for Chaotic Dynamics in the Soil-Plant-Atmosphere System: A Motivation for Future Research, *Procedia Environmental Sciences*, 2013, 19:681-690.

Increasing Evidence for Chaotic Dynamics in the Soil-Plant-Atmosphere System: A Motivation for Future Research, *Procedia Environmental Sciences*, 2013, 19:681-690.

K.B. De León, **B. Faybishenko**, B. D. Ramsay, D.R. Newcomer, T.C. Hazen, and M.W. Fields, Stimulation for *in situ* Cr(VI) Bioreduction Causes Convergence of Groundwater and Sediment-Adhered Bacterial Populations with Different Population Networks. Submitted to the Multidisciplinary *Journal of Microbial Ecology*, Journal of the International Society for Microbial Ecology (ISME), 2013.

Mosher J. J., T. J. Phelps, M. Podar, R.A. Hurt, J. H. Campbell, M. M. Drake, J. G. Moberly, C. W. Schadt, S. D. Brown, T. C. Hazen, A. P. Arkin, A. V. Palumbo, **B.A. Faybishenko**, D. A. Elias.

Microbial community succession during lactate amendment of chromium contaminated groundwater

reveals a predominance of *Pelosinus* spp. *Appl. Environ. Microbiol.* 78:2082-2091, 2012.  
doi:10.1128/AEM.05666.

Brodie, E.L., D. C. Joyner, B. **Faybishenko**, M. E. Conrad, C. Rios-Velazquez, B. Mork, A. Willet, S. Koenigsberg, D. Herman, M. K. Firestone, T. C. Hazen, J. Malave, Microbial community response to addition of polylactate compounds to stimulate hexavalent chromium reduction in groundwater, *Chemosphere* 01/2011; 85(4).

**Faybishenko**, B., Fuzzy-Probabilistic Calculations of Water-Balance Uncertainty. *Stochastic Environmental Research and Risk Analysis*, 24: 939–952, 2010.

**Faybishenko**, B., T.C. Hazen, P.E. Long, E.L. Brodie, M.E. Conrad, S.S. Hubbard, D. Joyner, S. Borglin, R. Chakraborty, K.H. Williams, J.E. Peterson, J. Chen, T.K. Tokunaga, J. Wan, M. Firestone, D.R. Newcomer, C.T. Resch, K.J. Cantrell, A. Willett, and S. Koenigsberg. In Situ Long-Term Reductive Bioimmobilization of Cr(VI) in Groundwater Using Hydrogen Release Compound, *Environmental Science & Technology*, 42 (22), 8478–8485, 2008.

Hubbard, S.S., K. Williams, M. Conrad, B. **Faybishenko**, J. Peterson, J. Chen, P. Long and T. Hazen, Geophysical monitoring of hydrological and biogeochemical transformations associated with Cr(VI) Biostimulation, *Environmental Science & Technology*, 42(10) pp 3757 - 3765; DOI 10.1021/es071702s, 2008.

**Faybishenko**, B., Climatic Forecasting of Net Infiltration at Yucca Mountain Using Analogue Meteorological Data, *Vadose Zone Journal* 6:77–92, 2007.

**Faybishenko**, B., Nonlinear dynamics in flow through unsaturated fractured-porous media: status and perspectives. *Reviews of Geophysics*. RG2003, doi:10.1029/2003RG000125, 2004.

**Faybishenko**, B., G.S. Bodvarsson, and R. Salve, On the physics of unstable infiltration, seepage and gravity drainage in partially saturated tuffs, *Journal of Contaminant Hydrology*, 62-63, pp. 63-87, 2003.

Unger, A., B. **Faybishenko**, G.S. Bodvarsson, and A. Simmons, Simulating infiltration tests in fractured basalt at the Box Canyon Site, Idaho, *Vadose Zone Journal*, 3, 75-89, 2004.

**Faybishenko**, B., Chaotic Processes in Flow through Fractured Rock: Field and Laboratory Experiments Revisited, In: *Subsurface Contamination Remediation: Accomplishments of the Environmental Management Science Program*, Volume 904, ACS Symposium Series, pp. 183-228, 2005.

**Faybishenko**, B., Chaotic dynamics in flow through unsaturated fractured media. *Advances in Water Resources*, 25/7, 793-816, 2002.

Mays, D.C. and B. **Faybishenko**, and S. Finsterle, Information Entropy to Measure Temporal and Spatial Complexity of Unsaturated Flow in Heterogeneous Media, *Water Resources Research*, 38(12), 1313, December 2002.

**Faybishenko**, B., C. Doughty, M. Steiger, J. Long, T. Wood, J. Jacobsen, J. Lore, and P. Zawislanski, Conceptual model of the geometry and physics of water flow in a fractured basalt vadose zone, *Water Resources Research*, 37(12), 3499-3522, 2000.

**Faybishenko**, B. Tensiometer for Shallow or Deep Measurements of Water Pressure in Vadose Zone and Groundwater, *Journal of Soil Sciences*, Vol.165, No. 6, 473-482, 2000.

Pruess, K., B. **Faybishenko**, and G. S. Bodvarsson, Alternative concepts and approaches for modeling flow and transport in thick unsaturated zones of fractured rocks, *Journal of Contaminant Hydrology - Special Issue*, 38, 281-322, 1999.

Zawislanski, P.T., and B. **Faybishenko**, New casing and backfill design for neutron access boreholes, *Ground Water Journal*, 37(1), 33-37, 1999.

Finsterle, S., and B. **Faybishenko**, Design and analysis of an experiment to determine hydraulic parameters of variably saturated porous media, *Advances in Water Resources*, 22(1), 431-444, 1999.

**Faybishenko**, B.A., I. Javandel and P.A. Witherspoon, Hydrodynamics of the Capture Zone for Contaminant Transport with Partially Penetrating Well in a Confined Aquifer, *Water Resources Research*, 31(4), 859-866, 1995.

**Faybishenko**, B.A., Hydraulic Behavior of Quasi-Saturated Soils in the Presence of Entrapped Air: Laboratory Investigations, *Water Resources Research*, 31(10), 2421-2435, 1995.

***Selected Patents***

Dzekunov, N.E., and B.A. **Faybishenko**, Device for the Determination of the Water Potential, *Inventor's Certificate of the USSR*, No.591761, 1977.

Dzekunov, N.E., B.A. **Faybishenko** et al., Device to Measure the Groundwater Level, *Inventor's Certificate USSR No.1046673*, 1982.

Gavrilov, S.A., N.E. Dzekunov, B.A. **Faybishenko** et al., Tensiometer, *Inventor's Certificate USSR No.1408258*, 1988.

Gorbunova, T.V., T.A. Konetskaya, and B.A. **Faybishenko**, Device for the Extraction of Pore Solutions from Soils with Different Moisture, *Inventor's Certificate USSR No.1493882*, 1988.

**Faybishenko**, B., Tensiometer for Shallow or Deep Measurements Including Vadose Zone and Aquifers, U.S. Patent 5,941,121, 1999.

Lee, K.H. A. Becker, B. **Faybishenko**, and R.Solbau, Electrical Resistivity Probes, US Patent 6,636,046 B2, Oct 21, 2003.

**Faybishenko**, B. Vadose zone water fluxmeter, US Patent 6,957,573, 2005.