

Brennan T. Smith

Earth, Aquatic, and Atmospheric Sciences Group
Environmental Sciences Division
Oak Ridge National Laboratory

P.O. Box 2008, MS-6036
Oak Ridge, TN 37831-6036
865-241-5160; fax: 865-576-3989
smithbt@ornl.gov

EDUCATION

Ph.D., Civil and Environmental Engineering (Hydraulics), University of Iowa, 1995

Thesis: Ice-cover influence on flow and bedload transport in dune-bed channels

M.S., Civil and Environmental Engineering, University of Iowa, 1992

B.E., Civil and Environmental Engineering, Economics, Vanderbilt University, 1990

PROFESSIONAL EXPERIENCE

Water Resources Engineer, April 2005 - present

Environmental Sciences Division, Oak Ridge National Laboratory

Water Resources Engineer, 1995 – April 2005

Tennessee Valley Authority, River Operations, Knoxville, TN

Primary function was providing hydrodynamic expertise to engineering design and operations groups within the TVA power generation system and river system. Specific ongoing responsibilities included:

- Support of regulatory compliance at TVA nuclear and fossil plant cooling water intakes and outfalls through detailed prototype flow field measurements in rivers, three-dimensional computational fluid dynamics (CFD) modeling, and empirical modeling.
- Physical modeling of hydraulic structures, including navigation locks and approaches, spillways, and cooling water intakes
- Physical and CFD modeling of power plant raw water system components.
- Design and deployment of real-time water temperature and flow measurement systems for power plant cooling water outfall thermal compliance monitoring.
- Assessment of hydroturbine performance through model and prototype testing, including environmental performance testing of aerating hydroturbines.
- Investigation of turbulence and its effects through full-scale, high-frequency acoustic-Doppler measurement of three-dimensional velocities in hydroturbines, hydraulic structures, and rivers.
- Diagnosis and solution of sediment and debris accumulation problems at TVA facilities
- Representation of TVA River Operations in forums involving sediment transport through the Tennessee River system.
- Consultation with TVA aquatic biologists on the hydrodynamics of native mussel habitat and transport

Graduate Research Assistant, 1990 – 1995

Iowa Institute of Hydraulic Research, University of Iowa, Iowa City, IA

- Laboratory flume studies of sediment transport and bedform development
- Measurement of velocities in physical models of hydroturbine intakes.

Nuclear Waste Management Intern, Summer 1989

Westinghouse Hanford Company, Richland, WA

- Compilation of hydrogeologic data for studies of tritium migration at the Hanford Site.

LICENSURE

Professional Engineer, State of Tennessee, License No. 00105293.

RESEARCH SKILLS

Expert in use of acoustic-Doppler current profilers (ADCP) for detailed flow field mapping in rivers
Experienced in measurement and analysis of turbulence in high speed flows using acoustic-Doppler velocimeters (ADV)
Competent in use of geographic information systems (GIS) software (ArcView, Generic Mapping Tools) for geospatial data analyses and presentation of complex field measurements of water velocity and temperature
Experienced in use of Gambit and Fluent software for geometry creation, meshing, and solution of CFD models
Experienced in piloting small boats for data collection in rivers

MEMBERSHIPS

American Society of Civil Engineers
International Association for Hydraulic Research
American Society of Mechanical Engineers
Tau Beta Pi National Engineering Honor Society
Chi Epsilon Civil Engineering Honor Society

PUBLICATIONS

Journals

- Smith, B. T., and R. Ettema. 1997. Ice-cover influence on flow structure over dunes. *Journal of Hydraulic Research* 35(5): 707-19.
Smith, B. T., and R. Ettema. 1997. Flow resistance in ice-covered alluvial channels. *Journal of Hydraulic Engineering* 123(7): 592-599.

Proceedings

- Lin, F., G. E. Hecker, P. N. Hopping, and B. T. Smith. 2003. Innovative 3-D numerical simulation of thermal discharge from Browns Ferry multi-port diffusers. *Proceedings of the International Joint Power Generation Conference*, June 16-19, 2003, Atlanta, GA.
- Smith, B. T., D. T. Darby, R. L. Dinkins, and P. B. Loiseau. 2002. Use of acoustic-Doppler velocimeters to measure hydroturbine draft tube and tailrace turbulence. *Proceedings of the ASCE/IAHR International Conference on Hydraulic Measurements and Experimental Methods*, July 28-August 1, 2002, Estes Park, Colorado.
- Hopping, P. N. and B. T. Smith. 2002. Measurement of flow patterns using GPS drogues. *Proceedings of the ASCE/IAHR International Conference on Hydraulic Measurements and Experimental Methods*, July 28-August 1, 2002, Estes Park, Colorado.
- Smith, B. T., and R. Ettema. 1994. Floating cover influence on sediment transport in dune-bed channels. *Proceedings of the ASCE National Conference on Hydraulic Engineering*, Buffalo, New York, August 1994.
- Smith, B. T., and R. Ettema. 1994. Flow over dunes in ice-covered channels. *Proceedings of the 12th International Symposium on Ice*, IAHR, Trondheim, Norway, August 1994.
- Smith, B. T., R. Ettema, V. C. Patel, and J. Y. Yoon. 1992. A laboratory and computational study of flow in ice-covered, dune-bed channels. *Proceedings of the 11th International Symposium on Ice*, IAHR, Banff, Alberta, June 1992.

Selected Internal Reports

- Wolff, P. J., B. T. Smith, and P. N. Hopping. 1997. Aeration performance tests for the new auto-venting turbines at Norris Dam, TVA Report WR97-1-2-120.
- Smith, B. T., P. J. Wolff, and P. N. Hopping. 1998. Scaling and uncertainty analyses for aerating turbine performance data, TVA Report WR98-1-600-126.
- Hopping, P.N., K. M. Stewart and B. T. Smith. 2003. Background and workplan for ambient temperature and mixing zone studies for Sequoyah Nuclear Plant as required by NPDES Permit No. TN0026450, TVA Report WR2003-1-45-148.
- Smith, B. T. 2003. Field verification of thermal effluent mixing at Allen Fossil Plant, TVA Report WR2003-2-38-104.
- Cole, L. L., W. L. Harper, P. N. Hopping, and B. T. Smith. 1998. 1997 verification studies of thermal discharge for Watts Bar Nuclear Plant. TVA Report WR97-2-85-141.
- Smith, B. T. 2000. Shawnee Fossil Plant intake channel improvement study final report. TVA Report WR2000-1-35-119.
- Hopping, P. N. and B. T. Smith. 2003. 2001 hydrothermal survey for Browns Ferry Nuclear Plant. TVA Report WR2002-4-67-134.
- Smith. B. T. 1999. 1:12 scale physical model of the Bull Run Steam Plant main steam condenser. TVA Engineering Laboratory Report.
- Kerley, B. L., B. T. Smith, and G. Brodie. 1997. Zebra mussel control options at Sequoyah Nuclear Plant, TVA Technology Advancements Closure Report.

REFERENCES

Mr. Patrick A. March
Senior Product Development Manager,
Tennessee Valley Authority
P. O. Box 1649
Norris, TN 37828
865-632-1903
pamarch@tva.gov

Dr. Robert Ettema
Professor and Research Engineer
IIHR-Hydroscience & Engineering
The University of Iowa
C. Maxwell Stanley Hydraulics Laboratory
Iowa City, Iowa 52242-1585
robert-ettema@uiowa.edu