Dam Break Flood Simulation - Doing It Faster and Simpler!
DSS-WISE™, DSS-WISE™ Lite, and DSAT

Silver Jackets – Flood Risk Management Program Webinar Week
20-22 August, 2013

Overview

The Decision Support System for Water Infrastructural Security (DSS-WISE™) is an integrated software package for two-dimensional dam and levee break flood simulation, inundation mapping and consequence analysis. DSS-WISE™ was developed by the National Center for Computational Hydroscience and Engineering at the University of Mississippi (UM-NCCHE). This effort was funded by the U.S. Department of Homeland Security (DHS) Science and Technology Directorate through the Southeast Region Research Initiative (SERRI) program managed by the Oak Ridge National Laboratory (ORNL). Through a joint effort between UM-NCCHE and DHS, a special version of the DSS-WISE™ software (DSS-WISE™ "Lite") is now available for performing first-tier dam-break simulation and mapping automatically using a user friendly graphical user interface implemented in the Dams Sector Analysis Tool (DSAT). DSAT is a web-based platform jointly developed by the DHS National Protection and Programs Directorate, Office of Infrastructure Protection, and the U.S. Army Corps of Engineers (USACE), Headquarters, Office of Homeland Security. DSAT provides Dams Sector partners with secure access to a series of modules and applications covering a wide range of analytical capabilities. DSAT contains a powerful web-based viewer with user-specific access that supports geospatial mapping, visualization, and analytical functions. In addition, the DSAT Viewer provides access to pre-processing capabilities to support dam-break flood simulations using DSS-WISE™ Lite. The purpose of this workshop is to provide participants with the working principles behind the DSS-WISE™ model, to discuss the implementation of DSS-WISE™ Lite as part of the DSAT web-based platform, and to provide workshop attendees hands-on experience using the suite of software tools.

Instructors

Mustafa Altinakar

Dr. Mustafa S. Altinakar is the Director (since 2010) and Research Professor (since 2003) at the National Center for Computational Hydroscience and Engineering (NCCHE) of the University of Mississippi in Oxford Mississippi, USA. He holds a Ph.D. (1988) in Hydraulics and a MS in Applied Mathematics from the Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, and M.S (1980) and B.S. (1978) degrees in Civil Engineering from the Middle East Technical University, Turkey. During 1997-2002, he served as the Head of the Fluvial Hydraulics Section and then as Acting Director of hydraulics lab at EPFL. From 1989 to 1997, while holding a part time Research Associate position at the EPFL, he also worked as a Senior Design Engineer and Project Manager at Bonnard and Gardel Consulting Engineers Ltd. in Lausanne and took part in several large-scale projects, including design of dams, hydroelectric power plants, flood protection schemes, drinking water supply and waste-water collection networks, etc. in Switzerland, France, Turkey, and North African countries. He taught undergraduate and graduate courses in fluid mechanics, hydraulics, sediment transport and contaminant transport and co-authored two text books; one on hydrodynamics and the other on fluvial hydraulics. He published more than 100 journal articles, conference papers, and articles in online encyclopedias. He delivered keynote lectures, short courses at universities and leading research institutes around the world, and organized several international conferences. Dr. Altinakar has served as PI for DSS-WISE and WGFEM projects funded by the DHS Science and Technology Directorate (S&T) through the Southeast Region Research Initiative (SERRI) program managed by the Oak Ridge National Laboratory (ORNL). These projects led to the development of DSS-WISE™ and WGFEM™ software packages,

which use shock capturing techniques for two-dimensional (2D) flood simulation by solving conservative form of full dynamic shallow water equations and can handle mixed-flow regimes and wetting and drying. He has given numerous presentations and taught short courses on flood modeling using DSS-WISE™ and WGFEM™ software packages.

Marcus McGrath

Marcus McGrath is a Ph.D. student and research assistant at the National Center for Computational Hydroscience and Engineering at the University of Mississippi. He began working at NCCHE in 2007 after completing his undergraduate degree in Mechanical Engineering at the University of Mississippi. His current efforts include development of two-dimensional dam-break flood modeling software called CCHE2D-FLOOD, which is the shock-capturing simulation engine at the core of DSS-WISE™ and DSS-WISE™ LITE software packages. In addition, he developed of the pre-processor tool behind DSS-WISE™ LITE that enables the estimation of unknown reservoir bathymetry. His research interests involves numerical modeling of shallow water equations using shock capturing techniques, numerical flood modeling and mapping, quadtree local mesh refinement for representing dam breach geometry using by decoupling it from the global mesh size, parallelization programming and implementation of special techniques for faster simulation of large areas with higher resolution. He has several papers and conference presentations on topics including case studies in dam break modeling, local mesh refinement for modeling dam breach geometry, and fast automated dam break modeling techniques. He took part in the River Flow 2010 Master Class in Braunschweig, Germany and presented his thesis topic. He has been an instructor in short courses related to DSS-WISE™ and its application to real-world problems.

Yazmin Seda-Sanabria

Yazmin Seda-Sanabria is the National Program Manager of the Critical Infrastructure Protection and Resilience Program of the U.S. Army Corps of Engineers, Headquarters, Office of Homeland Security. In this role, Ms. Seda-Sanabria oversees the development and implementation of a national risk management framework for the protection, security, and improved resilience of the USACE's portfolio of critical dams, navigation locks, and levees. Prior to her tenure at USACE Headquarters, she worked at the U.S. Army Engineer Research and Development Center as a research structural engineer in the Geotechnical and Structures Laboratory. Ms. Seda-Sanabria holds a Bachelor's degree and Master's degree in Civil Engineering from the University of Puerto Rico at Mayagüez. She also holds a Master of Science degree in Engineering Mechanics from Mississippi State University.

Strati Oktay

Strati Oktay is a Protection Operations Specialist with Battelle Memorial Institute providing technical support to the US Army Corps of Engineers Headquarters, Office of Homeland Security, under the Critical Infrastructure Protection and Resiliency Program, where he serves as the lead team coordinator for Consequence Studies and DSAT development. Mr. Oktay holds a Bachelor's degree in Chemical Engineering from Virginia Tech.