Texas A&M University Hydrologic Modeling Inventory
Model Description Form
Response requested by: May 25, 2007

Name of Model:

WASH123D

Model Type:
Conservation Principle-based, Physics-based, Distributed Model

Model Objective(s):

To simulate fluid flow, thermal transport, salinity transport, sediment transport, and water quality transport of hydrologic and biogeochemical cycles in a watershed of integrated reiver/stream/canal network, overland regime, and subsurface media

Agency and Office:

University of Central Florida; ORD, U.S. EPA; and ERDC, US Army Corps

Technical Contact and Address:

Gour-Tsyh (George) Yeh, University of Central Florida, 4000 Central Florida Blvd., Orlando, FL 3286

Model Structure or Mathematical Basis:

1D St Venant Equations, and 1D Salinity, 1D Thermal, 1D Sediment, and 1D Advection-Diespersion-Reactive Transport Equations of Multiple Species for River/Stream/Canal Network; 2D St Venant Equations and 2D Salinity, 2D Thermal, 2D Sediment, and 2D Advection-Diespersion-Reactive Transport Equations of Multiple Species for Overland Regime; and 3D Richards Equations and 3D Salinity, 3D Thermal, 3D Colloid, and 3D Advection-Diespersion-Reactive Transport Equations of Multiple Species for Subsurface Media.

Model Parameters:

Manings n and wind drag coefficients for surface flow, hydraulic conductivities and retention, relative hydraulic conductivities, and water capacity for subsurface flow. Dispersivities and molecular diffusion coefficients in both surface and ground water For scalor transport of thermal, salinity, sediment, and reactive

biogeochemicals, In addition, erosion and deposition parameters for sediment transport; reaction parameters and rate formulations for every reaction for sediment transport; and climate and weather date for thermal transport and fluid flow.

Spatial Scale Employed in the Model:

Variable Finite Element Meshes

Temporal Scale Employed in the Model:

Variable Time-Step Sizes

Input Data Requirements:

Model Option Control Parameters; Geometry; Boundary Conditions; Initial Conditions; Various Types of Structures; and Pumping and Management Rules.

Computer Requirements:

From PC, Workstation, to Super Computers depending on the size of the problems.

Model Output:

State variables (water depth, velocity components, pressure head, moisture content, total head, temperature, salinity, and concentrations of all biogeochemical species) and fluxes of every state variables.

Parameter Estimation / Model Calibration:

Manual calibrations are required.

Model Testing and Verification:

Extensive tested with 32 example problems.

Model Sensitivity:

Extensively tested in 32 example problems given in the documentation.

Model Reliability: Problem dependent

Model Application / Case Studies:

Many applications and case studies have been conducted for many projects in the CERP (Comprehensive Everglades Restoration Program).

Documentation: Technical Documents and Users Guides are available via ERDC, US Army Corps.

Other Comments:

A Complete Technical Report, "WASH123D: A Numerical Model of Flow, Thermal Transport, and Salinity, Sediment, and Water Quality Transport in WAterSHed Systems of 1-D Stream-River Network, 2-D Overland Regime, and 3-D Subsurface Media by Gour-Tsyh (George) Yeh, Guobiao Huang, Fan Zhang, Hwai-Ping (Pearce) Cheng, and Hsin-Chi (Jerry) Lin," is available from G. T. Yeh at UCF, Orlando, Florida.

A draft report, "A Numerical Model of Flow, Heat Transfer, and Salinity, Sediment, and Water Quality Transport in WAterSHed Systems of 1-D Stream-River Network, 2-D Overland Regime, and 3-D Subsurface Media (WASH123D: Version 2.0) by Gour-Tsyh (George) Yeh, Hwai-Ping Cheng, Guobiao Huang, Fan Zhang, Hsin-Chi Lin, Earl Edris, and David Richards," is available from ERDC, US Army Corps at Vicksburg, Mississippi.