

# BRANCH

**Model Uses** BRANCH is a physical model used to simulate flow in single or network of channels.

**Major Categories** Hydrology and Water Use; Water Quality; Geomorphology; Decision Support

**Subject Knowledge Level**  
Intermediate

**Minor Categories** Flow; Channel Classification; Time Series; Transport

**Technical Difficulty Level**  
Intermediate

**Model Type** Physical Model

**Geographic in Nature?**  
No

## **Abstract**

The Branch-Network Dynamic Flow Model--BRANCH--is used to simulate steady or unsteady flow in a single open-channel reach (branch) or throughout a system of branches (network) connected in a dendritic or looped pattern. BRANCH is applicable to a wide range of hydrologic situations where flow and transport are governed by time-dependent functions. BRANCH is particularly suitable for simulation of flow in complex geometric configurations involving regular or irregular cross sections of channels having multiple interconnections, but can be easily used to simulate flow in a single, uniform open-channel reach. Time-varying water levels, flow discharges, velocities, and volumes can be computed at any location within the open-channel network.

Streamflow routing and computation by the BRANCH model is superior to simplified-routing methods in open-channel reaches wherein severe backwater and (or) dynamic flow conditions prevail. Typical uses of the model encompass the assessment of flow and transport in upland rivers in which flows are highly regulated or backwater effects are evident, or in coastal networks of open channels wherein flow and transport are governed by the interaction of freshwater inflows, tidal action, and meteorological conditions. Surface- and ground-water interactions can be simulated by the coupled BRANCH and USGS modular, three-dimensional, finite-difference ground-water flow (MODFLOW) models, referred to as MODBRNCH.

## **Future Developments**

Unknown

## **Model Limitations**

Unknown

## **Model Features**

Computation abilities for any location along the network based on:

- Time varying water levels
- Flow discharge
- Velocity
- Volume

## **Required Data Types**

Input data consist of channel geometry and initial flow conditions defined at all cross-section locations and boundary conditions defined at channel extremities. Cross-sectional data, in the form of tables of top-width and area as functions of water level, describing the open-channel reaches can be manually prepared and formatted for input to the model or interactively entered, processed, and formatted using the Channel Geometry Analysis Program (CGAP). Initial flow conditions can be

## **Model Outputs**

Time series of computed flow results can be directly output in tabular or graphical form at all, or selected, cross-section locations. Tabular output options include discrete flow results at every time step or iteration; daily summaries of minimum, maximum, and average flow conditions; monthly flow-volume summaries; or river-mile locations of injected particles. Digital or line-printer graphical options include hydrograph plots of computed water levels or discharges or comparative plots of

measured, assumed, or interpolated values. Boundary conditions can be specified by equation, functional relations, or time-series values. Time series of boundary conditions, i.e., water levels or discharges, can be input directly via formatted sequential files or automatically retrieved from the data base of either the TDDS or the WDM system. Input values can be either in metric or inch-pound units.

computed results versus measured data. Graphical plots can be produced on CRT devices, directly, and (or) in CGM, PostScript, or HPGL formatted files for post processing. Computed results can be stored directly in text files or in the data base of either the TDDS or WDM. Interfaces are available for the USGS/WRD National Water Information System (NWIS) and the Branched Lagrangian Transport Model (BLTM). Output results can be either in metric or inch-pound units.

**Hardware Requirements**

386 or better processor;

At least 4mb RAM

**Software Requirements**

None Required.

**Cost, Licensing and Availability**

Model is offered free of charge from link provided.

**Source**

USGS

**Source (URL)**

<http://water.usgs.gov/software/branch.html>

**Supported Platforms**

DOS



UNIX



Windows



Macintosh

