PRODUCT DATA SHEET

Bentley
Advancing Infrastructure

OpenFlows™ FLOOD™

Complete Flood Modeling Software for Flood Risk Assessment and Resilience

Flood risk management is critical to enhance flood resilience in urban and built-up areas. Growing population and urbanization in a context of climate change is increasing the need for comprehensive management of flood risks to minimize impacts on human safety, economy, and environment.

By accurately simulating extreme rainfall events, ruptured dams or levees, rapid ice/snow melting, coastal storms, and tsunamis, OpenFlows FLOOD can help deliver top infrastructure design and structural adaptive solutions, as well as aid in emergency planning and green initiative design. With a complete multi-scale 1D/2D approach, the application can also be used in the configuration of Flood Early Warning Systems (FEWS).

Urban Flooding

Urban flooding can be triggered by excessive local rainfall, overtopping of river defences, and/or insufficient flow capacity of drainage systems, posing risks for human safety, damaging property and infrastructure, and disrupting urban services. OpenFlows FLOOD can produce detailed simulations of the extent of urban floods, helping identify bottlenecks and hotspots that hinder the capacity of the stormwater drainage systems. OpenFlows FLOOD scenario management can guide professional flood modelers to delineate efficient solutions to increase resilience of urban drainage systems and prioritize the implementation of mitigation measures such as Low-Impact Development (LID) and Green Initiatives.

OpenFlows FLOOD is a complete Flood Modeling Software for understanding and mitigating flood risks in urban, riverine, and coastal systems.

Riverine Flooding

Riverine flooding can cause property and infrastructure damage in built-up areas, loss of agricultural production, disruption of infrastructure operations (railways, roads), and hazards from large industrial facilities (e.g. oil or hazardous substances spills).

Screenshot of OpenFlows FLOOD used for Flood Risk Assessment.

OpenFlows FLOOD can efficiently address riverine flooding by producing inundation maps, flood risk maps, and hazard maps in relation to problems such as riverine conveyance and river defences capacity and large-scale land use changes. The software can help understand, evaluate, and optimize reservoir operations. It can also design and improve emergency structures as well as outline flood resilient land use strategies, all within a climate change context.

Coastal Flooding

High tides, storm surges, sometimes in combination with insufficient urban drainage capacity or high upstream river flows, as well as tsunamis, can cause coastal flooding, damaging property and infrastructure in low-lying areas, including coastal defences.

OpenFlows FLOOD dynamically models the complex array of processes related with coastal flooding to assess the flood extent, including those originated by tsunami waves. It provides accurate solutions for dimensioning and improving storm surge and tsunami protection schemes.

System Requirements

Processor
1.8 GHz or faster

Memory (RAM)
2 GB or more

Display Color Depth
32 bits

Display Resolution
1280x800 or higher

Disk Space
500 MB

Software
Windows 8, 10, Server or later, Microsoft.NET, Framework 4.7

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OpenFlows FLOOD At-A-Glance

Areas of Application
- Rivers
- Estuaries
- Coastal areas
- Urban drainage systems

Flood Simulation Due to
- Heavy rainfall and storm events
- Saturation of soils
- Dam break
- Levee/Dike breach
- Inefficient urban drainage capacity
- Storm surge
- Tsunamis

Hydraulics
- 2D overland flow
- 1D river/open channel bidirectional flow
- 1D pipe flow model
- 1D river and 1D pipe coupling with 2D overland flow
- 3D subsurface flow
- Adaptive variable time step
- Extended period simulations
- Kinematic, diffusion, and dynamic wave (St. Venant equations) approaches
- Multiple point discharges input
- Multiple open boundary conditions
- Infiltration methods: Green-Ampt and SCS Curve number
- Dynamic simulation of surface and groundwater interaction
- Robust, accurate, and fast numerical solvers
- OpenMP parallel processing technology

Hydrology
- Spatially and temporally variable precipitation
- Automatic separation of precipitation into snow and rainfall
- Multiple evapotranspiration methods
- Water uptake by vegetation roots
- Precipitation interception by vegetation

Environmental Processes
- Transport and dispersion of dissolved and particulate matter
- Sediment transport (erosion, deposition)
- Splash erosion

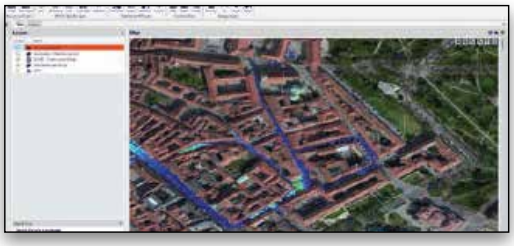
Graphical Interface and Visualization
- Rich graphical user Windows interface
- Map display with dynamic zooming and navigation
- Multiple background layer support (OpenStreetMaps, Bing)
- Dynamic multiparameter and multiscenario graphing
- Property-based color coding and symbology
- Surface water flow direction displayed across any terrain
- Automatic input and result fields filtering
- Automated flood and hazard mapping
- User-defined cross-section flow visualization
- Node and time series data/results visualization
- Multiple layout templates
- Static and dynamic (animations) outputs

Model Building
- Build and manage hydraulic models
- Create and edit geographical data layers (points, lines, polygons)
- Computational grid generation
- Digital terrain model generation, processing and editing
- Various 2D spatial interpolation methods
- Digital terrain model depression removal capability
- Automatic watershed and drainage network delineation
- Automatic computation of watershed area, slopes, and flow direction
- Automatic construction of default cross-sections (Strahler order, drained area)
- Irregular cross-sections support
- Cross-sections editing capability
- Spatially-variable data processing capabilities
- Automatic generation of curve numbers from land cover data
- Automatic generation of Manning coefficients
- Rain gauge network spatial and temporal interpolation capabilities
- Automatic generation of meteorological data from models and reanalysis databases

Interoperability
- Support for GDAL Raster formats (ARC, ADF, TIFF, etc.)
- Support for ESRI Shapefile format
- Support for WKT format
- Export to KML Google Earth format
- Automatic import of NASA DTM database (worldwide)

Simulation and Scenario Management
- Load and process models
- Restart simulations
- Unlimited scenarios and alternatives
- Comprehensive scenario management
- Scenario comparison

The figure shows a screenshot of OpenFlows FLOOD map engine during the implementation of an urban flood model.



The figure shows a screenshot of OpenFlows FLOOD during the visualization of results in an urban environment.

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