PRODUCT DATA SHEET

OpenFlows™ FLOOD™

Complete Flood Modeling Software for Flood Risk Assessment and Resilience

Flood risk management is critical for enhancing flood resilience in urban and developed areas. Growing populations, urbanization, and climate change are increasing the need for comprehensive flood risk management to minimize impacts on safety, the economy, and the environment.

By accurately simulating extreme rainfall events, ruptured dams or levees, rapid ice or snow melts, coastal storms, and tsunamis, OpenFlows FLOOD can deliver top infrastructure design and structural adaptive solutions. It also helps flood risk managers with emergency planning and green-initiative design. With a complete multiscale 1D/2D approach, the application can also be used to configure flood early warning systems (FEWS).

Urban Flooding

The triggers of urban flooding include excessive rainfall, overtopping of river defenses, and insufficient drainage flow capacity that poses risks to residents, damages property and infrastructure, and disrupts urban services. OpenFlows FLOOD can mitigate these issues by producing detailed simulations of urban flooding that identify bottlenecks and hotspots that hinder the capacity of stormwater drainage systems. OpenFlows FLOOD scenario management allows professional flood modelers to create efficient solutions that increase the resilience of urban drainage systems and implement mitigation measures such as low-impact development and green initiatives.

OpenFlows FLOOD is a complete flood modeling application that helps you understand and mitigate flood risks in urban, riverine, and coastal systems.

Riverine Flooding

The effects of riverine flooding include damage to property and infrastructure, a decline in agricultural production, disruption of infrastructure operations such as railways and roads, and environmental disasters stemming from damage to oil rigs.

OpenFlows FLOOD prevents riverine flooding risks by producing inundation maps, flood risk maps, and hazard maps that address riverine flows, river defense

Screenshot of OpenFlows FLOOD used for assessing flood risk.

capacity, and large-scale land use changes. The software helps you understand, evaluate, and optimize reservoir operations. It also designs and improves emergency structures as well as outlines flood-resilient land use strategies, all within a climate change context.

Coastal Flooding

High tides, storm surges, and tsunamis, sometimes in combination with insufficient urban drainage capacity or high upstream river flows, can cause coastal flooding and damage to property, infrastructure, and coastal defenses in low-lying areas.

OpenFlows FLOOD dynamically models the complex array of processes related to coastal flooding to assess the extent of flooding, including floods caused by tsunami waves. It provides accurate solutions for defining and improving storm surge and tsunami protection plans.

System Requirements

Platform Pre-requirements
OpenFlows FLOOD runs without platform restrictions as a stand-alone application

Processor
As per minimum operating system requirements

Memory
8 GB minimum, 16 GB recommended

Operating System
Microsoft Windows 10, Windows 10 x 64, Windows 8, Windows 8 x 64 Windows 7, Windows 7 x 64

Note: Windows 7 operating system is supported only with its service pack (SPI) installed

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OpenFlows FLOOD At-A-Glance

Areas of Application
- Rivers
- Estuaries
- Coastal areas
- Cities and urban drainage systems

Flood Simulation Due to
- Heavy rainfall and storm events
- Soil water saturation
- Dam breaks
- Levee or dike breach
- Inefficient urban drainage capacity
- Storm surge
- Tsunamis
- Sea level rise
- Exceptionally high tides

Hydraulics
- 2D overland flow
- 1D river/open channel bidirectional flow
- 1D pipe flow model (OpenFlows SewerGEMS®/ SWMM solvers)
- 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
- Fecal contamination dispersion
- Biochemical oxygen demand
- Transport and dispersion of dissolved and particulate matter
- Sediment transport via erosion or deposition
- Splash erosion
- Advanced water quality and water pollution modeling engine: transport, dispersion, and transformation of water quality properties, nutrients, and pollutants

Graphical Interface and Visualization
- Rich graphical user Windows interface
- Map display with dynamic zooming and navigation
- Multiple background layer support in 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 and results visualization
- Multiple layout templates
- Static and dynamic outputs

Model Building
- Automatic coupling between 2D overland flow and OpenFlows SewerGEMS or SWMM 1D drainage network models
- Automatic generation of inlets from buildings and streets
- Dam break outflow hydrograph generation tools
- 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 areas, slopes, and flow direction
- Automatic construction of default cross-sections (Strahler order, drained area)
- Irregular cross-sections support
- Cross-section editing capability
- Spatially variable data processing capabilities
- Automatic generation of curve numbers from land cover data
- Automatic generation of Manning coefficients
- Spatial and temporal interpolation capabilities for rain gauge networks
- Automatic generation of meteorological data from models and re-analysis databases
- Dam break outflow hydrograph generator

Interoperability
- Import Bentley TIN format digital terrain model files
- Direct import of ContextCapture 3D digital terrain models
- Output formats compatible with LumenRT
- Support for GDAL Raster formats (ARC, ADF, TIFF, etc.)
- Support for EsriShapefile format
- Support for WKT format
- Export to KML Google Earth format
- Automatic import of NASA DTM database (worldwide)
- Native output format seamlessly supported by LumenRT's 3D visualization tool

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