HE 2D Product information

Urban flash floods

Calculation of flooding through urban flash floods. The hydraulic simulation of the surface runoff in case of a canalization overload is done by means of a 2-dimensional calculation approach. The spatial extent, the chronological progression and the water depth of flooding may be analyzed. Precautionary measures may be deduced from the analysis and verified for their effectiveness.

Calculation of flooding through urban flash floods

Functionalities of the software

“Urban flash floods” is the itwh software package for the calculation of flash floods caused by heavy rainfall. The package contains the 2-dimensional surface runoff model HYSTEM-EXTRAN 2D and FOG for the administration of sewer system models as well as FOG 2D for the creation of the terrain model in ArcGIS.
Exceptionally heavy rainfall events lead to the overload of sewer systems with the implication that flash floods with negative impacts on urban infrastructure or even danger to life can occur. With the itwh software package “urban flash floods” the hazards of heavy rainfall can be analyzed in detail. Through the linkage of the sewer system model HYSTEM-EXTRAN with the 2-dimensional surface runoff model HYSTEM-EXTRAN 2D a detailed simulation of the runoff processes in the sewer system and on the surface is made.

Thereby

- spatial extent
- chronological progression and
- water depthdie

may be analyzed and visualized.
In the calculation the sewer system model HYSTEM-EXTRAN and the 2D model HYSTEM-EXTRAN 2D of the surface are linked bidirectionally through manholes and street inlets. The water leagage from the sewer system through overflow, as a result of the overload of the sewer system, as well as the reentry, if capacities are available, are visualized in detail. The results of the calculations may be visualized and classified to assess the entent of potential damage through flash floods. This in turn forms the basis for a risk assessment acording to DWA-M 119.

itwh GmbH | Engelbosteler Damm 22 | 30167 Hannover | Tel. +49 511 971 93-0 | itwh@itwh.de | www.itwh.de

Field of application

- Hazard analysis by means of simulation of flash floods with random rainfall events (natural of model rainfall and radar rainfall data) according to DMA-M 119
- Verification of possibilities of a damage-free discharge aboveground
- Simulation of planning options
- Basis for investigation of flash flood risk

itwh software package “Urban flash floods”: Flexible and workflow-oriented

The menu navigation in the itwh software package “Urban flash floods” is workflow-oriented: All required tool are included, starting with the data preprocessing as well as the automated creation of the calculation model up to the visual evaluation of the results.

Data modelling

- Separate data management: FOG 7 supports the management of initial data required for the creation of 2D models. Geometric input data for the automated model creation, i.e. buildings and breaklines as well as the position of street inlets, are managed in a geodatabase in order to be immediately available for the creation of various model variants. As known from HYSTEM-EXTRAN 7, the administration of sewer system related data takes place in the model and result data base *.idbf.
- Hydraulic 2D surface runoff model: Instead of a simplified hydrological model, an extensive surface runoff calculation, on the basis of 2D shallow water equations, is used. The equations are solved by means of the extremely stable Finite Volumes method.
- Smooth 2D model creation: The extensive user support encompasses for example the data import, the data tailoring for the area to be modeled, the allocation of attributes, such as roughness and overflow depths, as well as the linkage of the hydraulic sewer system model with the 2D surface model.
- Topologically consistent input data: Via a preconfigured topology assessment the data is examined concerning its suitability for the automated model creation.
- Exact configuration of the model generation: The automated model generation may be configured via the parameters so that the level of detail and the degree of smoothing of the elevation data can be specified in the elevation data model.

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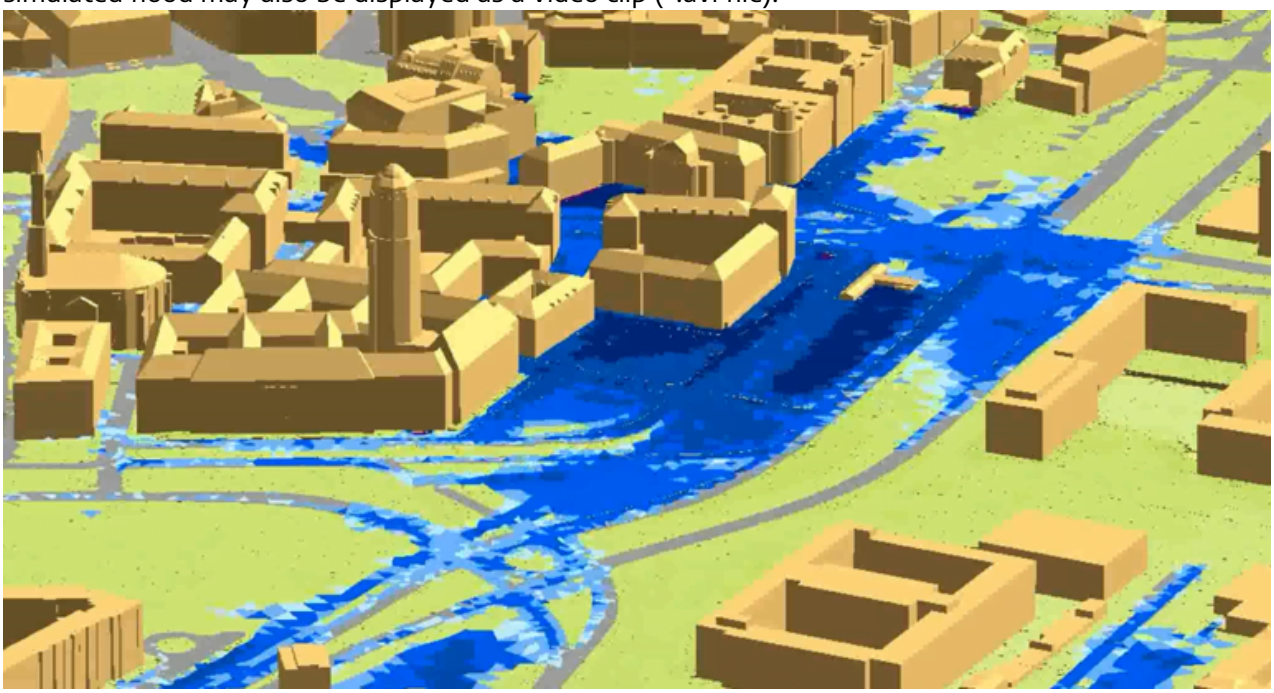
Linkage of sewer system- and 2D surface runoff models

The sewer system model and the 2D surface runoff model are coupled together. The coupling takes place at the manholes and street inlets. As a result of the linkage of both models, in conjunction with the extensive calculation approach, a realistic model is formed. In contrast to other hydrological models, depressions and hollows are implicitly considered.

Various versions of the sewer system- and 2D surface runoff model may be combined for the simulation of planning options (the use of linkage manholes with the same name is a prerequisite).

Visualization

The calculation approaches of HYSTEM-EXTRAN 2D are visualized in FOG 7. The water levels may be displayed in a chronological sequence for the output steps. The chronological sequence of the simulated flood may also be displayed as a video clip (*.avi file).



Digitales Geländemodell mit Senken und Fließwegen / Zum Vergrößern anklicken

Furthermore...

...the software package “Urban flash floods” naturally takes into account the conventional guidelines, such as the DWA working paper A 119 and the DIN EN 752.

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System requirements

FOG 2D (GIS-Desktop)

- Operating systems: Windows 10, Windows 8 or Windows 7 (respectively 64-Bit)
- At least ESRI ArcGIS 10.1 Desktop Basic
- For networking: MS Windows Server (others on request), catalogue with full access privileges for all users

HYSTEM-EXTRAN 2D (Simulation computer)

- Operating systems: Windows 10, Windows 8 or Windows 7 (respectively 64-Bit)
- HYSTEM-EXTRAN 7.8
- For networking: MS Windows Server (others on request), catalogue with full access privileges for all users

Prices and Services

For prices, licenses and further information, please do not hesitate to contact us.

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