

TUFLOW

Flood and tide simulation software

Halcrow is the sole UK based agents for BMT WBM's TUFLOW software. By purchasing TUFLOW from Halcrow, users benefit from having access to Halcrow's UK based support team, in addition to the services provided by BMT WBM – all at no extra cost!

Floods and storm tides cause extensive damage, stress, loss of life and displace communities. To understand and manage these risks requires modelling software that takes on the challenge of accurately predicting inundation patterns.

TUFLOW models flooding in major rivers through to complex overland and piped urban flows; estuarine and coastal tide hydraulics; and storm tide inundation.

TUFLOW is a one-dimensional (1D) and two-dimensional (2D) flood and tide simulation software. It simulates the complex hydrodynamics of floods and tides using the full 1D St Venant equations and full 2D free-surface shallow water equations.

Solution scheme

TUFLOW's 2D solution is based on the Stelling finite difference, alternating direction implicit (ADI) scheme that solves the full 2D free surface shallow water flow equations over a regular grid. The 1D scheme is a finite difference, second-order, Runge Kutta solution.

The schemes have been improved to handle upstream controlled flow regimes (e.g. supercritical and weir flow), bridge decks, box culverts, robust wetting and drying, and other key features.

Capabilities – an overview

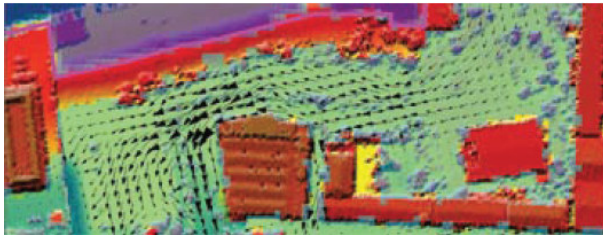
- robust and rapid wetting and drying
- superior 1D and 2D linking options
- multiple 2D domains of any orientations and cell sizes
- 2D representation of hydraulic structures
- automatic flow regime switching over levees and embankments
- 1D and 2D supercritical flow and weir flow
- flexible and effective data management
- constructs models from layers of GIS data
- quality control outputs

A proven and reliable solution for modelling

- flooding in major rivers
- complex overland and piped urban flows
- storm tide inundation of coastal plains
- estuarine and coastal tidal hydraulics.

Links to other software

- the ISIS-TUFLOW link has been developed to enable models built in ISIS Professional (1D) to be dynamically linked to TUFLOW, offering unparalleled performance in 1D-2D hydraulic modelling.
- produce flood maps and animated flood sequences using ISIS Mapper (available for free)
- dynamic links between the XP-SWMM 1D scheme and TUFLOW
- construct models using the SMS or XP-SWMM Graphical User Interfaces or alternatively use a GIS for data management and presentation



TUFLOW modelling of storm tide inundation from a hypothetical breach along the River Thames, London

Dynamic linking

The dynamic linking capability between domains is a major strength of TUFLOW. With the adaptation of TUFLOW to floodplain modelling, more flexible and complex linking was developed. The advanced linking functions have been extensively applied to a wide range of models varying from major river systems to fine-scale urban flood models to coastal storm tide inundation.

Linking of 1D and 2D domains

1D and 2D domains can be linked anywhere along the perimeter of the active 2D cells. The links can be at any orientation to the 2D grid, start completely dry, and wet and dry during a simulation.

1D elements inside 2D domains

Internal links are used to model flowpaths within or under the 2D domains that are better represented using a 1D solution. This may be a culvert through an embankment, or a complex pipe network.

Multiple 2D domains

The study area can be divided into any number of 2D domains, with each domain having its own orientation and cell resolution. These domains can be linked to form one overall model.

MapInfo and TUFLOW productivity tools (miTools)

miTools have been developed to improve the efficiency of setting up and reviewing TUFLOW models, as well as improving the day to day ease of using MapInfo. It enables 'automation' of many of the common repetitive tasks, saving time and money.

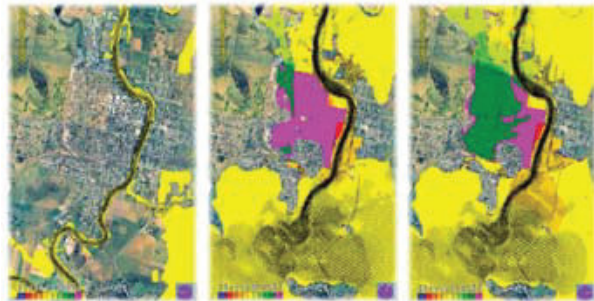
1D waterway in a 2D floodplain

More advanced linking allows the modelling of a waterway in 1D and overbank areas in 2D. This is useful where the drain, creek or river is too coarsely represented by the 2D resolution and is better represented by 1D cross-sections and structures.

Results presentation

TUFLOW outputs SMS and GIS formatted files containing a variety of data, such as water levels, velocity vectors, depths, unit flow vectors, energy level, flood hazard categories, Froude number and other data types. The user can readily:

- display DTMs, aerial photos and other GIS data in the background.
- create computer animations showing the rise and fall of the flood using ISIS Mapper, SMS, WaterRIDE or XP-SWMM.
- interactively select and graph time-series results from the 1D and 2D domains.
- produce high quality maps for reports, plans and public displays using GIS.



Computer animation stills showing the effect of a proposed levee for Casino, Richmond River, New South Wales. The three stills are at the start, before the peak and at the peak of the flood.

Yellow indicates <5cm change in flood level, red/orange shades indicate an increase and green shades a decrease. Pink areas were previously flooded, but are now flood-free if the levee is built.

UK based technical support

Organisations purchasing TUFLOW from Halcrow have access to our dedicated UK based technical support team in addition to the services provided by BMT WBM at no extra cost.

Halcrow charge exactly the same prices as BMT WBM, with a standalone TUFLOW lock available from just £5,500.

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