Extending the ANUGA Framework with Flood Modelling Capabilities

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ANUGA was released to the public in December 2006, as a model capable of predicting the behaviour of a tsunami striking the coastline and interacting with terrain and buildings. Rudy's specific interest was in attempting to use ANUGA to model riverine flooding. As such in consultation with the Ole Nielsen the ANUGA code was augmented to allow rainfall to be placed directly on the 2D domain.

This was further enhanced to allow rainfall to be constrained to a polygon. This also allowed several polygons to be defined an in effect provide spatially varying rainfall over a catchment. Similarly negative rainfall in effect became equivalent to infiltration or even evaporation (a removal of moisture from the domain!).

However there are other aspects of "flood modeling" that are different to "tsunami modeling". One aspect is the critical role played by bridges and culverts in flood modelling. In order to be really useful in the flood modeling arena a model must at least have the ability to account for bridges and culverts and ultimately also account for the entire piped drainage system.

Currently ANUGA has been further extended to provide the ability to model culverts and bridge openings as in effect a 1-D element. Importantly however ANUGA also accounts for the conservation of momentum through these structures.

Other issues that will further enhance ANUGA that are penciled in for further development include:

1. Piped Drainage System capability (Pits and Pipes)
2. Sediment & Erosion in Riverine environment
3. Sediment and Erosion on open beaches.

The presentation will cover aspects of the transition of ANUGA from a purely tsunami model to a quite capable flood model.

It will demonstrate a wide range of applications for the model, from detailed assessment of flow through a set of bridge piers to a 110km^2 catchment, as ANUGA has now been used to model dozens of catchments and scenarios.

It will also provide some insight into the likely ongoing development into other areas.

Note the next aspect involves Validation of ANUGA as a flood model (refer to Presentation 2)