

Webinar Q&A: Building confidence in CFD modelling with FLOW-3D HYDRO

#	Question	Answer
1	could you talk about the models in sediment transportation and how is related to turbulence? thanks can we change the source code to model sediment transport? or how can we improve the current model found currently?	Sure! With the sediment transport model, sediment grains are lifted from the bed and entrained by turbulent eddies. This scour process is driven by the bed shear stress, which we get from our 3D hydraulics model. It's also possible to use your own code, but this is more advanced. There are various parameters available in the software. You can have an overview of that model here: https://www.youtube.com/watch?v=QW5sFzprus
2	In what format was the bathymetry for the fishway simulation entered into the model.	I believe it was 3D scanned and a STL file was imported. You can also use raster files (TIF, ASC) or a TIN surface to represent 3D surfaces in FLOW-3D HYDRO.
3	What rheological models are available in FLOW-3D HYDRO for describing non-Newtonian fluids? Is the Voellmy model available?	We use the Herschel-Bulkley model to define rheological properties of non-Newtonian fluids.
4	Could you provide an overview of using FLOW-3D for simulating hypothetical dam break scenarios, particularly in generating flood inundation maps for areas around 200 square kilometers? Additionally, how does FLOW-3D compare with models like HEC-RAS when simulating overtopping or piping breach scenarios? Can FLOW-3D efficiently simulate and calculate peak discharge over large inundation areas using the full Saint-Venant equations, and does it support the integration of DEM or bathymetry survey cross-sections? Finally, could you suggest relevant real-world case studies or research publications that apply FLOW-3D Model?	For simulating a dam break scenario, the best way would be to use a hybrid 2D-3D approach: simulating the breach portion in 3D, to capture the complex nature of the flow, then use a 2D model (available in FLOW-3D as the Shallow Water model - based on St-Venant equations). Based on user feedback, I believe our FLOW-3D model compares well with HEC-RAS and actually performs better when there's a 3D component to the flow. You can import DEM and bathymetry from GIS (raster, Geotiff, LandXML). You can find some case studies on our website: https://www.flow3d.com/resources/case-studies/
5	Can you get non-newtonian fluids to interact with sediment transport, i.e. mud or tailings flows?	While the sediment transport model may function with the tailings physics model, they were not validated to interact with each other. I invite you to watch our Tailings Model webinar to learn more: https://youtu.be/_vLibD1xzEg?si=KyFtsV6EDYrpJt4O
6	for Francis hydraulic turbines, some of them have an air entrance to reduce vibration in partial loads. is it possible to simulate how it can change? with and without air injection?	For that application, you could use the 2-fluid VOF approach to model the air flow through the air entrance you mention. Please contact us at info@flow3d.com.au if you would like to explore this application further.
7	Are the CPU Core limits based on physical cores or threads?	Physical cores.
8	And I'm not sure if you covered this, but does FLOW-3D have the option to parallelize onto a GPU?	We are always looking into ways to speed up the simulations. From our initial investigations, the free-surface 3D modelling does not scale well on GPUs. It is something we are monitoring, but at the moment, FLOW-3D only runs on CPU cores.
9	On September 28, 2024, a significant rainfall event occurred in Nepal, affecting most of the city and countryside. The heavy rainfall and subsequent flooding led to the deaths of more than 80 people. Additionally, landslides triggered by the rainfall resulted in severe riverbank erosion and substantial sediment transport by floodwaters. This model could be utilized for future flood prediction. The discharge was underestimated, due to the sediment. Can you provide information about the model's purchasing cost and the availability of training in the Boston area of the United States from January 1 to March 31, 2025? If training is available in the specified location, please provide the contact information and location of the organization. Thank you	Yes. This was a very severe event. Considering you are based in the US, you can send me an email at jon@flow3d.com . We could set a time to discuss about training options, licensing and related pricing. Thanks!
10	Are you interested in using more exotic mesh shapes similar to what Ansys Fluent has available?	We use a simple meshing method (FAVOR), which is a cartesian mesh. The nice thing is that it's really easy to set-up and fast. That speed is needed in cases with sediment transport or moving object where we have to re-mesh at every timestep. There are also more advanced meshing techniques available, such as a conforming mesh and mesh geometry objects that allow you to create more complex meshes. For more info on the difference v.s. body-fitted meshes: https://www.flow3d.com/resources/cfd-101/modeling-techniques/favor-vs-body-fitted-coordinates/
11	Very informative session. I am working on peatland restoration. I have to do hydro geological modelling of cutaway bogs. My question is can we use it peatland modelling ?	I am not sure FLOW-3D is the best tool for that. We can define object (e.g. terrain) as porous, but I guess it depends what you are trying to achieve. If you are more interested in modeling inundations, I believe a 2D model would be best suited
12	Would there be an application for this modelling to assist assess and devise ways to reduce plastic pollution in the oceans and rivers?	FLOW-3D's particle and moving object physics could also be used to represent plastic objects suspended within the fluid.
13	Would be great to have a seminar on good ways to use the post-processing software available for Flow 3D	There are some FLOW-3D POST training materials available through the Getting Started site that is provided along with the on-demand FLOW-3D HYDRO training course. It would also be possible to arrange more one-on-one FLOW-3D POST training as part of the training module.