Master Class on Modelling Mixing Mechanisms

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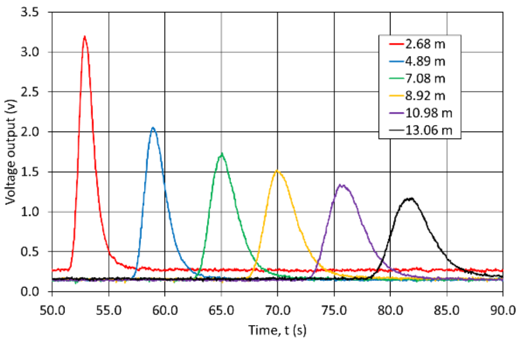
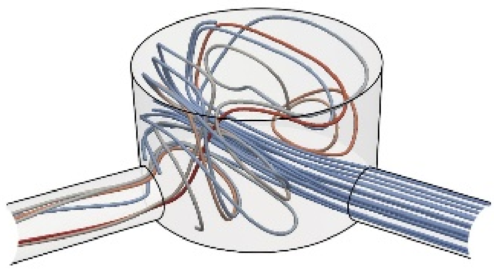
The management of water quality in rivers, urban drainage and water supply networks is essential for ecological and human well-being. Predicting the effects of management strategies requires knowledge of the underlying physical, chemical and biological processes covering spatial scales of a few millimetres (e.g. turbulence) to several hundred kilometres (e.g. catchment topography), with a similarly large range of timescales from milliseconds to weeks. The evolution of water quality indicators such as dissolved oxygen concentration, chemical pollutant levels and deviations from ambient temperatures is complicated because they depend on spatially and temporally varying contaminant concentrations, which are driven by a (often uncertain) distribution of unsteady loadings. Current water quality modelling methods range from complex three-dimensional computational fluid dynamics models, for short time and small spatial scales, to relatively simple one-dimensional and/or network models, for large scale systems. The latter category are essential for delivering economic, fast and practical solutions for routine management of water industry functions as well as for providing guidance on emergency responses to pollution incidents. A proper representation of solute mixing is required for these models to be reliable. Mixing effects in channels and pipes of uniform geometry can be represented with confidence in highly turbulent, steady flows. However, in the majority of water systems, the standard model predictions often fall short because of knowledge gaps, for example when faced with non-uniform geometry, regions of low turbulence, unsteady flows or uncertain contaminant sources.

This Master Class will allow the participants a chance to present their work and to discuss their results with experts and other students. We are keen to attract papers on laboratory investigations of mixing mechanisms, full-scale field measurements, analytical and numerical models, analysis of meta-data and descriptions of pollution incidents.





Pipes and Urban Drainage Structures

Ponds, Vegetation & Rivers