CFD and Laboratory Model Studies for Optimal Chlorine Contact Tank Performance

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Project Summary
The research project focuses on the further development of Computational Fluid Dynamics (CFD) models of Chlorine Contact Tank (CCT) processes, using numerical and laboratory modelling methods. The aim is to enhance the simulation capability of the flow, mixing and disinfection processes, as well as reactions of chlorine compounds and the formation of by-products.

Numerical Modelling
The study has been revolving around the use of custom made software developed at Cardiff University. There is CONTANK which is a two-dimensional CFD software specific to the processes appearing in contact tanks, based on the more popular DIVAST source code, and STRATUS, a more recent source code that was developed:

⇒ Currently examining models with simplified geometries to appreciate the accuracy of the output of each turbulence model compared to previous experimental studies.
⇒ Hydrodynamic conditions, Solute transport as well as Disinfection processes are parameters aiming to accurately represent.
⇒ Future work will aim at the refinement of software by applying methods that incorporate considerations of recent CCT research.
⇒ Laboratory experiments will be later used to validate the results.

Physical Modelling
Laboratory experiments are going to constitute a significant proportion of this study:

⇒ Plans include the use of Acoustic Doppler Velocimetry to obtain results for hydrodynamic conditions.
⇒ Tracer experiments are applied to examine solute transport and supply hydraulic efficiency indexes for baffling configurations.
⇒ The potential of experiments dealing with disinfection reactions is still examined and is included in the future prospects of this study.

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Flow Pattern based on CFD results, while testing different turbulence models. (STRATUS software)

Photograph of the Prototype Tank, illustrating the setup with 8 compartments, implemented for the experimental aspect of the project