

MSc thesis / internship

Influence of two different types of vortex treatment on bacterial physiology

Motivation:

A sustainable, additive free improvement of the quality of drinking water is of major importance. It is known that the flow pattern of water in nature is always spiral, and vortices are naturally occurring in every river. This behaviour was first studied in detail by Austrian forester Victor Schaubberger, according to whom sustainable technology should be developed according to the principle "first understand, then copy nature". Indeed, there are all sorts of mechanical treatment based on natural processes on the market. Such mechanical treatments like twirling (or "vortexing" = twirling accompanied by the formation of a vortex) are said to have significant impact on the microbiological, chemical and physical properties. This impact is (partly) due to increased gas exchange and increased dissolution of solids, thereby changing physical and chemical properties of the water, and consequently also its microbiome. The aim of the proposed master project is to start with basic physiological properties of microbial cells exposed to vortex treatment.

Research challenge

Two different types of vortex systems (hyperbolic funnel and a vortex created by a turning disc) are to be studied and compared to understand their influence on microbial cells.

Autoclaved tap water or other liquid media will be spiked with different concentrations of a variety of bacterial cells and the solution will be applied to the vortex systems. The influence of vortexing time, temperature, speed and volume on the growth behaviour of the cells and on their structural integrity will be studied. Therefore a number of different techniques (e.g. growth curve, flow cytometry, confocal laser scanning microscopy) have to be applied and developed.

Research institute

Wetsus, Centre of Excellence for Sustainable Water Technology is located in Leeuwarden, The Netherlands. The institute employs people from very different fields and backgrounds and there exists a lot of interaction between them, leading to a smooth transfer of knowledge. This project is embedded in a PhD project on non-chemical water treatment using magnetic fields and hyperbolic vortices in the Applied Water Physics Theme. Wetsus has an international environment where the working language is English, so fluency is required.

Requirements

We are looking for a candidate with a BSc degree in the field of microbiology, molecular biology or biochemistry. The project has a duration of 6 months.

Application

If you are interested in this project, please contact theme coordinator Dr. Elmar C. Fuchs (elmar.fuchs@wetsus.nl) for more information or directly apply by sending your CV to the same address. The internship includes a reimbursement for living expenses of 350 euro per month.