MASTER'S THESIS

# Real-time optical fibre sensing of phytoplankton for studies in size distribution and concentration

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# Real-time Optical Fibre Sensing of Phytoplankton for Studies in Size Distribution and Concentration

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## ABSTRACT

Flow Cytometry is a powerful equipment for particle analysis in microbiology. The tight optical alignment of the cytometer limits its usage for *in situ* particle analysis in oceanography. A modified flow cytometer was proposed to overcome the alignment requirement. It incorporated the technology of optical fibre, laser Doppler velocimetry, laser induced fluorescence and digital signal processing. A laboratory version of the proposed system was built on an optical breadboard for feasibility testing. The laboratory setup was used to measure two species of phytoplankton (Chlorella and Scenedemus). The result indicates that reliable size measurement can be obtained by the modified flow cytometer. A series of experiments for measurement of particle size with different flow rates demonstrated that the equipment measured particle size independent on the particle velocity. The constrain of constant flow of sample fluid through the measurement volume in ordinary flow cytometer is relaxed. The system is suitable to be further develop into a practical *in situ* field instrument.

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