Real-time Ocean Optical Fiber Sensing
of
Phytoplankton for Studies in
Size Distribution, Concentration and Biomass

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Abstract

Flow cytometry is a powerful technique for particle analysis in medical science. It has found useful applications in biophysical applications such as phytoplankton analysis. Phytoplankton is a good indicator of seawater quality. Developing a field type flow cytometry to obtain information of phytoplankton is a good and efficient way to monitor the seawater quality. The critical optical alignment of the cytometer limits its application in field measurement. A modified flow cytometer was proposed to overcome the alignment requirement and the cytometer developed requires no sample preparations to enable monitoring the seawater quality in field at all times. Our system combines the techniques of flow cytometer, laser Doppler velocimetry, laser induced fluorescence and optical fibre sensing to overcome problems in field measurements. The setup was used to measure size distributions and concentration for cultured phytoplankton, seawater samples and actual field measurement. Corresponding size distribution and concentration of different water samples from different coastal areas of Hong Kong show a promising development of our new technique. The success of field measurement proved the system has potential for further development into a practical portable instrument to study phytoplankton ecology and to monitor seawater quality.
## Table of contents

Declaration i
Abstract ii
Acknowledgement iii

List of Figures vii

1. **Introduction**
   1.1 The importance of phytoplankton 1
   1.2 Current methods for measuring phytoplankton size distribution 2
      1.2.1 Counting of cells 3
      1.2.2 Chloroplast pigments 4
      1.2.3 Fluorometer 5
      1.2.4 Flow cytometers 6
   1.3 Aims of the project 8

2. **Theory**
   2.1 Experimentation 11
   2.2 Wave properties of light 13
      2.2.1 Coherence 13
      2.2.2 Polarization 16
      2.2.3 Interference 17
   2.3 Basic principle of Flow Cytometry 20
   2.4 Particle scattering 23
   2.5 Laser Differential Doppler Velocimeter – LDDV 25
   2.6 Laser Induced Fluorescence - LIF 29
   2.7 Determination of particle size 31

3. **The measurement system**
   3.1 Laboratory setup and field measurement setup 35
3.2 The optical setup
3.3 Electronic setup
3.4 Digital signal processing system (DSP)
   3.4.1 Advantages and Limitations of DSP system
   3.4.2 The DSP system used – CASPA
      3.4.2.1 Hardware
      3.4.2.2 Software
   3.4.3 Signal processing technique
3.5 Samples preparation

4. Results
   4.1 Laboratory experimental results of cultured phytoplankton
   4.2 Laboratory experimental results of sea water phytoplankton
   4.3 In-field experimental results

5. Discussion
   5.1 Discrimination of valid events
      5.1.1 One phytoplakton particle passing through the measurement volume
      5.1.2 One non-phytoplankton particle passing through the measurement volume
      5.1.3 Multiple particles passing through inside the measurement volume simultaneously
      5.1.4 Multiple particles passing through out of the measurement volume simultaneously
      5.1.5 Multiple phytoplankton particles passing through the measurement volume simultaneously
      5.1.6 Elimination of invalid signal elimination by Hamming windowing
      5.1.7 Too weak fluorescence signal
      5.1.8 Not well structured Doppler signal
   5.2 Scattering from non-sphere particle
   5.3 Comparison of measured particle size between our technique and
traditional method

5.4 Limitations and advantages of this technique
  5.4.1 Limitations
  5.4.2 Advantages

6. Conclusion and Further Development
  6.1 Conclusion
  6.2 Further Development

7. Reference

8. Appendix A - Culture of phytoplankton

9. Appendix B - CVI display panels
   9.1 Main menu
   9.2 CASPA control panel
   9.3 Project panel
   9.4 FFT panel
   9.5 Size Distribution panel

10 Appendix C
   10.1 PMT, IV converter circuit diagram
   10.2 PMT specifications
   10.3 ILT 5500 laser specification
   10.4 Selection of incident angle

11 Appendix D - Program listing
   11.1 Assemble program listing
   11.2 CVI program listing

12 VITA