

Dual wavelength heterodyne LDA for velocity and size distribution measurements in ocean water flows

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Air-sea coupling and energy circulation inside the ocean are the frontiers of ocean science and important directions of earth system science. Researchers have carried out extensive research on multi-scale dynamic characteristics and ecological environment parameter based on the development of advanced remote sensing technology. However, the lack of the non-invasive in-situ detection technology for the high resolution measurement of the marine micro-scale characteristics, biological, physical and chemical restricted the study of the microscale phenomenon and biological optics inside the ocean. The development of in-situ detection techniques for microscale turbulence and particle size distribution in the ocean mixing layer would improve the understanding of the energy and matter transport inside the ocean. This article focus on the great demand for the high resolution in-situ detection technology during the study of micro-scale turbulent flow structure and the size distribution measurement of small scale suspended particles. A laser Doppler current probe (LDCP) has been designed for the measurement of distributed two-component velocity with high spatial resolution. The sensor is an extension of the principle of Laser Doppler Anemometry (LDA). It is non-intrusive, highly accurate and able to highly resolve the flow both in the time and spatial extensions. The LDCP has been proved to be effective tools to capture the micro-scale oceanic turbulence by carried out field campaign at Yellow Sea. Algorithm to calculate the distribution of the suspended particles with small scale (1~10 μ m) has developed and it has been validated by the laboratory campaign.