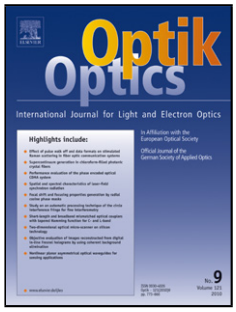

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Water Wave Gauge Based on Singlemode-Multimode-Singlemode Fiber Structure

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Abstract

A simple wave gauge that uses a single-mode-multimode-single-mode (SMS) fiber structure is investigated in this paper. The SMS interferometer is packaged with Cr-39 plastic polymer plates in order to gauge water waves in the laboratory flume. The working principle of the sensor is based on the linear uniform fiber bending mechanism, which, because of the wave frequency, changes the light interference pattern and output power. In the experiment, the intermediate depth wave of $0.18<d/L<0.25$ was generated in the flume. The average power corresponded to the SMS at wave celerities ranging from 0.43–0.57 m/s, exhibiting almost perfect periodic manner. The results of the frequency spectrum showed that the proposed SMS fiber structure could be exploited in measuring water wave celerity and wavelength, yielding linear sensitivities of 2.0304 Hz/ (m/s) and 1.5613 Hz/ m, respectively.

Keywords: water celerity; laboratory flume; wave gauge; Singlemode-Multimode-Singlemode Fiber Structure (SMS)