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Fiber loop ringdown gas flow sensor

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Abstract

A novel fiber loop ringdown- airflow (FLRD-AF) sensor based on the fiber loop ringdown technique has been developed to measure airflow. The sensor has been applied to measure airflow in different rates based on the micro-bending sensing mechanism. The sensor was designed with two different configurations. In the first configuration, the FLRD-AF sensor head was suspended horizontally, and air flow was applied vertically to the sensor head. The optical loss resulting from micro-bending of the sensor head increases as the airflow rate increases. In the second configuration, the sensor head was suspended vertically with a small bead attached. Airflow pushed the bead up, and bending loss occurred. In both configurations, the FLRD-AF sensor demonstrated reproducible and consistent results in terms of the sensing signal ringdown time. The FLRD-AF sensor can measure airflow ranging from 5 stander liter per minute (slpm) to 22.5 slpm. The measureable airflow speeds of the sensor were in the range of 5.83- 310.88 m/s. The FLRD- AF sensor has several advantages, such as temperature independence, fast response, near real-time response, free of chemical coatings in the sensor head, and a large dynamic range, as compared to other types of fiber optic airflow sensors. This new type of the optical fiber airflow sensor will have broad applications in the remote detection of airflow at various rates.

Biography

Haifa Alali has completed her B.S. at the age of 22 years from King Faisal University in Saudi Arabia. She is studying her M.S. degree at Mississippi State University in physics. She has been working in developing optical fiber sensor for the past two years. She has one published paper in Optics and Photonics Journal **"**Fiber Optic Sensors and Sensor Networks Using a Time-domain Sensing Scheme**".**