A New Sensor for Web Flutter Measurement

Article

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Abstract

A new sensor for web flutter measurement is proposed in this paper. The sensor is based on the principle of scattering of light and directional properties of optical fibers. A collimated beam of light is incident on the web edge and scattered light from the web edge is collected using a linear array of optical fibers. As the web flutters the point of scattering moves. Due to the directional property of the optical fibers, each fiber collects scattered light that is incident on it at certain angles. The motion of the scattering point as the web flutters is directly related to which fibers are being illuminated within the fiber array. The other end of the fiber array is terminated onto a linear array of photodiodes (pixels). Based on which fibers in the array are receiving scattered light and the amount of light received, the transverse displacement (web flutter) of the web can be determined. This paper describes the construction and working of the new sensor for web flutter measurement. Experiments conducted on a web platform show that the sensor measures web flutter repeatably. The frequency response of the sensor is limited only by the scanning rate of the pixel array and not by the flutter measurement method. A dedicated signal processing circuit can be used to obtain a desired scanning rate, thus, a desired frequency response.

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