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Usefulness of the fiber-optic interferometer for the investigation of the seismic rotation waves

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Keywords

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Abstract

In the paper new areas of the fiber-optic Sagnac interferometer applications are discussed and proposed. Because this system detects the absolute rotation, its application is directly designed for detection of the seismic rotation waves which are rotational events existing in the seismic waves. In most cases those waves are extracted from recordings of differential seismic signals. However, all differences in responses of the seismometers cause disturbances which obscure these hidden components as it is for two antiparallel pendulum seismometers (TAPS) system. The presented device, named fiber-optic rotational seismometer (FORS), is free from this disadvantage and may be used for other rotational seismometer calibration, as well as for direct seismic rotation waves detection. The paper describes the design based on a well-known optical gyroscope configuration but with its optimization for its optimization for detection the absolute rotation, only. The obtained results have been the source of TAPS work improvement by applying the data smoothing by a spline function. Moreover, the first application of FORS for recording rotational parts existing in the seismic events has shown that they probably propagate with different velocity than classical earthquake waves.



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