

A high sensitivity giant dual-polarization fiber optic gyroscope for rotational seismology

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Recently, due to its remarkable stability and portability, the interferometric fiber optic gyroscope (IFOG) has been widely considered for ground rotation motion observation. In order to improve the sensitivity of the IFOG, the dual-polarization configuration is applied to a giant polarization-maintaining fiber coil (the length of 20 km and the diameter of 52 cm). In this giant dual-polarization IFOG, the reverse phase modulation with a higher order of eigen frequency is adopted, which can effectively suppress the excess relative intensity noise (excess RIN) and can also reduce the thermal phase noise that is a significant noise in the giant fiber coil caused by the fluctuation of the refractive index of the fiber due to the atomic thermal motion. Experiments have shown that a detection sensitivity of $4.5 \text{ nrad/s}/\sqrt{\text{Hz}}$ is obtained in this proposed IFOG, which indicates its excellent applicability for rotational seismology.