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### ABSTRACT

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The present invention discloses a wading structure health sensing distributed optical fiber calibration system and a method. The system comprises a heat insulation barrel, and a plurality of calibration modules located in the inner ring of the heat insulation barrel around an axis thereof, wherein the calibration module comprises a through-shaft, a first electronic thermometer and a second electronic thermometer, an optical cable to be calibrated is twisted on the through-shaft, the optical cable to be calibrated is connected to an optical fiber temperature demodulator outside the heat insulation barrel, the first electronic thermometer and the second electronic thermometer are respectively connected to a first temperature control meter and a second temperature control meter outside the heat insulation barrel, a temperature source wire for heating water in the heat insulation barrel is arranged in the wall of the heat insulation barrel, the temperature source wire is connected to a power temperature control meter outside the heat insulation barrel, and the first temperature control meter is connected to cooling and heating devices simultaneously through leads of the first temperature control meter. According to the wading structure health sensing distributed optical fiber calibration system of the present invention, high precision calibration on long distance optical cables can be implemented by single times by flexibly controlling the temperature changes in the heat insulation barrel through the cooling and heating devices.

**Fig. 1**