

Distributed Brillouin fiber sensor for detecting pipeline buckling in an energy pipe under internal pressure

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A distributed Brillouin fiber sensor has been employed to detect localized pipe-wall buckling in an energy pipe by measuring the longitudinal and hoop strain distributions along the outer surface of the pipe for the first time. The locations of the localized pipe-wall buckling are found and distinguished using their corresponding strain-load data. The formation of the buckling process for the compression and tension characters is studied in the longitudinal and hoop directions. For the pipe with internal pressure, concentric load, and bending load, a localized pipe-wall buckling takes place away from the middle of the pipe on the compressive side and a strain peak with an overall buckling occurs on the tensile side according to the longitudinal strain distributions along the pipe. Different strains on two neutral lines are also observed in the hoop strain distribution, which should be caused by the pipe weld joint. © 2006 Optical Society of America

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