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Automatic Data Acquisition System for Offshore Oil Pipeline Magnetic Flux Leakage On-line Inspection

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In order to assure the safety of oil pipeline transmission, it is very important to continue routine inspection of offshore pipelines to identify defects or corrosions as early as possible. A high-speed inspection data acquisition system was developed for the magnetic flux leakage (MFL) method, with 12 bit sampling precision and 1.25 M/s sampling frequency. This system consists of a micro-computer, electronic memory, pre-processing circuit, power unit, digital signal processor (DSP), Field Programmable Gate Array (FPGA) and other components. The method adopts hardware and software cooperation to control data acquisition, filtering, encoding, handling, storage and transmission. The main function is MFL signal pre-processing, real-time data acquisition, de-noising and data compression. The basic characteristics of the system, design considerations, data filtering, data compression methods and experiment results are described. Experiments showed the system has a good performance.

Keywords: Pipeline inspection, Magnetic flux leakage, Adaptive filter, Data compression